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FOR THE

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Harbor Lines.—Baltimore Harbor and Patapsco River, Md., 1693; Curtis Bay, Baltimore Harbor, Md., 1697.

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REPORT OF LIEUT. COL. CHAS. J. ALLEN, CORPS OF ENGINEERS.

Improvements.—Potomac River at Washington, D. C., 1702; Potomac River below Washington, D. C., 1706; Occoquan Creek, Va., 1709; Nomini Creek, Va., 1711; Lower Machodoc Creek, Va., 1714; Rappahannock River, Va., 1715; Urbana Creek, Va., 1717; harbor at Milford Haven, Va., 1719; York River, Va., 1721; Mattaponi River, Va., 1722; Pamunkey River, Va., 1724; James River, Va., 1725; Jamestown Island, Va., 1736; removing sunken vessels or craft obstructing or endangering navigation, 1738.

Examinations and Surveys.—Patuxent River, Md., 1739; Breton Bay, Md, 1743; Carters Creek, Va., 1747; Jacksons Creek, Middlesex County, Va., 1753; James River at Richmond, Va., 1754.

Harbor Lines.—James River at Richmond, Va., 1761.

APPENDIX M.

REPORT OF MAJ. JAMES B. QUINN, CORPS OF ENGINEERS.

Improvements.—Harbor at Norfolk and its approaches, Va., 1763; Western Branch of Elizabeth River, Va., Nansemond River, Va., 1765; Appomattox River, Va., 1766; harbor at Cape Charles City, Va., 1768; Nandua Creek, Va., 1771; waterway from Norfolk, Va., to the sounds of North Carolina, 1773; inland water route from Norfolk, Va., to Albemarle Sound, N. C., through Currituck Sound, 1778; Edenton Bay, N. C., 1780; Roanoke River, N. C., 1782; removing sunken vessels or craft obstructing or endangering navigation, 1783.

Examination and Survey.—Middle Ground Bar, Hampton Roads, Va., 1785.

Harbor Lines.—Elizabeth River, at Norfolk, Va., 1791.

PART III.

APPENDIX N.

REPORT OF CAPT. E. W. VAN C. LUCAS, CORPS OF ENGINEERS.

Improvements.—Ocracoke Inlet, N. C., 1793; Fishing Creek, N. C., 1796; Pamlico and Tar rivers, N. C., 1798; Contentnia Creek, N. C., 1801; Trent River, N. C., 1802; Neuse River, N. C., 1804; inland waterway between Newbern and Beaufort, N. C., 1806; harbor at Beaufort, N. C., 1808; inland waterway between Beaufort Harbor and New River, N. C., 1810; New River, N. C., 1812; Black River, N. C., 1813; Northeast (Cape Fear) River, N. C., 1815; Cape Fear River, N. C., above Wilmington, 1816; Cape Fear River, N. C., at and below Wilmington, 1818; Town Creek, Brunswick County, N. C., 1827.

Examinations and Survey.—Harbor of refuge, Cape Lookout, N. C., 1829.

Harbor Lines.—Trent and Neuse rivers at Newbern, N. C., 1837.

APPENDIX O.

REPORT OF CAPT. J. C. SANDFORD, CORPS OF ENGINEERS.

Improvements.—Waccamaw River, N. C. and S. C., 1841; Little Pedee River, S. C., 1845; Great Pedee River, S. C., 1847; Georgetown Harbor, S. C., 1850; Winyah Bay, S. C., 1851; Santee River, S. C., 1856; Wateree River, S. C., 1860; Congaree River, S. C., 1863; Congaree River, S. C., from Gervais Street Bridge, Columbia, to Granby, 1864; harbor at Charleston, including Sullivans Island and Mount Pleasant Shore, S. C., 1867; Wappoo Cut, S. C., 1872; Beaufort River, S. C., 1873; removing sunken vessels or craft obstructing or endangering navigation, 1875.

Examinations and Surveys.—Lynchs River, S. C., 1876; Sampit River, S. C., 1883; Estherville-Minim Creek Canal to Alligator River, S. C., 1894; Wee Tee Lake, Williamsburg County, S. C., 1903; waterways between Charleston Harbor and Alligator Creek, S. C., 1908.

APPENDIX P.

REPORT OF CAPT. CASSIUS E. GILLETTE, CORPS OF ENGINEERS.

Improvements.—Savannah Harbor, Ga., 1913; Savannah River, Ga., 1928; Savannah River above Augusta, Ga., 1930; Doboy Bar, Ga., 1933; Darien Harbor, Ga., 1935; Altamaha River, Ga., 1939; Oconee River, Ga., 1942; Ocmulgee River, Ga., 1944; Brunswick Harbor, Ga., 1948; inside water route between Savannah, Ga., and Fernandina, Fla., 1953; Cumberland Sound, Ga. and Fla., 1956; removing sunken vessels or craft obstructing or endangering navigation, 1961.

Examination and Survey.—Brunswick, Ga., inner harbor, 1962.

APPENDIX Q.

REPORT OF CAPT. C. H. McKINSTRY, CORPS OF ENGINEERS.

Improvements.—St. Johns River, Fla., 1967; St. Johns River at Orange Mills Flats, Fla., 1972; Volusia Bar, Fla., 1978; Ocklawaha River, Fla., 1980; St. Augustine Harbor, Fla., 1981; Indian River, Fla., 1982; harbor at Key West, Fla., and entrance thereto, 1983; removing the water hyacinth from Florida waters, dredge for river and harbor improvements, Fla., 1985.

Examination.—Biscayne Bay, Fla., from Miami to the sea, via Norris Cut, Bears Cut, and Cape Florida Entrance, respectively, 1986.

APPENDIX R.

REPORT OF CAPT. THOS. H. REES, CORPS OF ENGINEERS.

Improvements.—Caloosahatchee River, Fla., 2015; Charlotte Harbor and Peace Creek, Fla., 2017; Sarasota Bay, Fla., 2018; Manatee River, Fla., 2020; Tampa Bay, Fla., 2022; Hillsboro Bay, Fla., 2025; Anclote River, Fla., 2028; Withlacoochee River, Fla., 2029; Suwanee River, Fla., 2030; removing sunken vessels or craft obstructing or endangering navigation, 2032.

Examinations and Surveys.—Orange River, Fla., to the Caloosahatchee, thence to the Gulf, 2032; inside passage from Punta Rasa to Charlotte Harbor, Fla., 2041; Boca Grande and Charlotte Harbor, Fla., 2048; inside passage through Sarasota Bay to Lemon Bay, Fla., 2054; Bay at Hudson, Pasco County, Fla, 2166; Crystal River, Fla., 2074.

Harbor Lines.—Hillsboro River at Tampa, Fla., 2084.

APPENDIX S.

REPORT OF CAPT. C. A. F. FLAGLER, CORPS OF ENGINEERS.

IMPROVEMENTS.—Carrabelle Bar and Harbor, Fla., 2088; Apalachicola Bay, Fla., 2091; Apalachicola River, the Cut-off, and lower Chipola River, Fla., 2095; upper Chipola River, Fla., from Marianna to its mouth, 2099; Flint River, Ga., 2101; Chattahoochee River, Ga. and Ala., 2106; Choctawhatchee River, Fla. and Ala., 2112; Lagrange Bayou, Fla., including Holmes River from Vernon to its mouth, 2116; Pensacola Harbor, Fla., 2118; Blackwater River, Fla., 2126; Escambia and Conecuh rivers, Fla. and Ala., 2129; Alabama River, Ala., 2132; Coosa River, Ga. and Ala., 2137; operating and care of canals and other works of navigation on Coosa River, Ga. and Ala., 2145.

EXAMINATIONS AND SURVEYS.—Ocklockonnee River, Fla., 2146; East Pass at entrance to Carrabelle Harbor, Fla., 2152.

HARBOR LINES.—St. Georges Sound at Dog Island, Fla., 2158.

APPENDIX T.

REPORT OF MAJ. WM. T. ROSSELL, CORPS OF ENGINEERS.

IMPROVEMENTS.—Harbor at Mobile, Ala., 2161; Black Warrior River, Ala., from Tuscaloosa to Daniels Creek, 2167; operating and care of locks and dams on Black Warrior River, Ala., 2171; Warrior and Tombigbee rivers, Ala. and Miss., 2177; Noxubee River, Miss, 2208; Pascagoula River Miss., 2209; Pascagoula River and Horn Island Harbor, Miss., 2211; Chickasahay River, Miss., 2213; Leaf River, Miss., 2215; channel from Gulfport to Ship Island Harbor, Miss., Ship Island Pass, Miss., 2216; Pearl River at mouth, Miss., 2217; Pearl River below Jackson, Miss., 2218; Pearl River between Carthage and Jackson, Miss., 2220; Pearl River between Edinburg and Carthage, Miss., 2221; Bogue Chitto, La., 2222; removing sunken vessels or craft obstructing or endangering navigation, 2223.

APPENDIX U.

REPORT OF MAJ. H. M. ADAMS, CORPS OF ENGINEERS.

INSPECTION of the improvement of the South Pass of the Mississippi River, 2225.

APPENDIX V.

REPORT OF MAJ. H. M. ADAMS, CORPS OF ENGINEERS.

IMPROVEMENTS.—Chefunte River and Bogue Falia, La., 2240; Tickfaw River and its tributaries, La., 2241; Amite River and Bayou Manchac, La., 2243; closing crevasse in Pass a Loutre, Mississippi River, 2245; outlet of the Mississippi River, 2246; bayou Lafourche, La., 2249; Bayou Plaquemine, Grand River, and Pigeon bayous, La., 2251; Bayou Courtableau, La., 2259; Bayou Teche, La., 2260; channel, bay, and passes of Bayou Vermilion, La., 2262; Mermentau River and tributaries, La., 2264; mouth and passes of Calcasieu River, La., 2266; Johnsons Bayou, La., 2268; removing water hyacinths from Louisiana waters, 2270; mouths of Sabine and Neches rivers, Tex., 2272; Sabine River, Tex., 2274; harbor at Sabine Pass, Tex., 2276; Homochitto River, Miss., 2280; removing sunken vessels or craft obstructing or endangering navigation, 2282.

EXAMINATIONS AND SURVEYS.—Atchafalaya Bay, La., 2282; Southwest Pass, Mississippi River, 2287; channel through Sabine Lake, Tex. and La., 2302.

PART IV.

APPENDIX W.

REPORT OF CAPT. C. S. RICHÉ, CORPS OF ENGINEERS.

IMPROVEMENTS.—Galveston Harbor, Tex., 2308; ship channel in Galveston Bay, Tex., 2325; channel from Galveston Harbor to Texas City, Tex., 2326; Galveston Ship Channel and Buffalo Bayou, Tex., 2327; operating and care of Morgans Canal, Tex., 2328; Trinity River, Tex., 2329; Buffalo Bayou, Tex., 2330; channel in West Galveston Bay, Tex., 2331; mouth of Brazos River, Tex., 2332; Brazos River between Velasco and Richmond, West Galveston Bay Channel, Double Bayou, and the mouths of the adjacent streams, Tex., 2334; Brazos River, Tex., 2335; Aransas

Pass, Tex., 2336; harbor at Brazos Santiago, Tex., 2340; removing sunken vessels or craft obstructing or endangering navigation, 2341.

EXAMINATIONS AND SURVEYS.—Turtle Bayou, Tex., 2342; Trinity River, Tex., 2348; East Bay Bayou, Tex., 2379; Clear Creek, Tex., 2385; Dickinson Bayou, Tex., 2396; Chocolate Bayou, Tex., 2403; Highland Bayou, Tex., 2410; Bastrop Bayou, Tex., 2414; Oyster Creek, Tex., 2418; mouth of Brazos River, Tex., 2426; San Bernard River, Tex., 2438; Caney Creek, Tex., 2453; Colorado River, Tex., from mouth to foot of great raft, 2458; canal around the raft in Colorado River, in Matagorda County, Tex., 2461; harbor at Alligator Head, Matagorda Bay, Tex., 2462; harbor at Brazos, Santiago, Tex., 2469.

HARBOR LINES.—Galveston Harbor, Tex., at Fort San Jacinto, 2475; San Jacinto Bay at Laporte, Tex., 2476.

APPENDIX X.

REPORT OF MAJ. THOS. L. CASEY, CORPS OF ENGINEERS.

IMPROVEMENTS.—Red River, La., Ark., and Ind. Ter., 2480; Cypress Bayou, Tex. and La., 2502; Ouachita and Black rivers, Ark and La., 2503; Bayou Bartholomew, La. and Ark., 2513; Bœuf River, La., 2515; Tensas River and Bayou Maçon, La., 2517; Yazoo River, Miss., 2519; mouth of Yazoo River and harbor at Vicksburg, Miss., 2524; Tallahatchie River, Miss., 2534; Big Sunflower River, Miss., 2537; water gauges on Mississippi River and its principal tributaries, 2540.

EXAMINATIONS AND SURVEYS.—Ouachita and Black rivers, Ark. and La., 2544; Red River, Tex., 2565; Alexandria Harbor, La., 2569.

APPENDIX Y.

REPORT OF CAPT. ROBERT McGREGOR, CORPS OF ENGINEERS.

IMPROVEMENTS.—Removing obstructions in Arkansas River, Ark. and Kans., 2577; Arkansas River, Ark., 2581; White River, Ark., 2592; Upper White River, Ark., 2596; Buffalo Fork of White River, Ark., 2601; Cache River, Ark., 2602; Black River, Ark. and Mo., 2604; Current River, Ark. and Mo., 2608; St. Francis River, Ark., 2610; removing sunken vessels or craft obstructing or endangering navigation, 2613.

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APPENDIX Z.

REPORT OF CAPT. EDW. BURR, CORPS OF ENGINEERS.

IMPROVEMENTS.—Removing snags and wrecks from Mississippi River below Missouri River, 2621; Mississippi River between Ohio and Missouri rivers, 2631; harbor at St. Louis, Mo., 2664; to prevent the Mississippi River from breaking through into the Cache River at Beechridge, above Cairo, Ill., 2666.

EXAMINATIONS AND SURVEYS.—Mississippi River below Rockwood, Ill., 2667; Mississippi River at or near Beechridge, Ill., 2672.

APPENDIX A A.

REPORT OF MAJ. C. McD. TOWNSEND, CORPS OF ENGINEERS.

IMPROVEMENTS.—Operating snag boats and dredge boats on Upper Mississippi River, 2679; Mississippi River between mouth of Missouri River and St. Paul, 2692; operating and care of Des Moines Rapids Canal and Dry Dock, 2744; operating and care of Galena River improvement, Ill., 2752; harbor at La Crosse, Wis., 2755.

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APPENDIX B B.

REPORT OF MAJ. F. V. ABBOT, CORPS OF ENGINEERS.

IMPROVEMENTS.—Mississippi River, between St. Paul and Minneapolis, Minn., 2768; construction of reservoirs at headwaters of Mississippi River, 2786; operating and care of reservoirs at headwaters of Mississippi River, 2800; Chippewa River, including yellow banks, Wis., 2806; St. Croix River, Wis. and Minn., 2809; Minnesota River, Minn., 2812; Red River of the North, Minn. and N. Dak., 2814; bar at mouth of Warroad River, Minn., 2820; gauging Mississippi River at or near St. Paul, Minn., 2821.

EXAMINATIONS AND SURVEYS.—Red Lake and Red Lake River, Minn., 2828; Otter Tail Lake and Otter Tail River, Minn., 2830; Big Stone Lake and Lake Traverse, Minn. and S. Dak., 2833; St. Croix River, Minn., 2836; Minnesota River, Minn., 2840; Red River of the North, Minn. and N. Dak., 2841.

APPENDIX C C.

REPORTS OF LIEUT. COL. AMOS STICKNEY, CORPS OF ENGINEERS, PRESIDENT MISSOURI RIVER COMMISSION.

PRELIMINARY examinations and surveys of Missouri River at Huntsdale and Napoleon, Mo., 2847, 2852.

APPENDIX D D.

REPORT OF CAPT. H. M. CHITTENDEN, CORPS OF ENGINEERS.

IMPROVEMENTS.—Missouri River between Stubbs Ferry, Mont., and lower limits of Sioux City, Iowa, 2859; snagging Upper Missouri River, 2882.

APPENDIX E E.

REPORT OF LIEUT. COL. M. B. ADAMS, CORPS OF ENGINEERS.

IMPROVEMENTS.—Obion River, Tenn., 2887; Forked Deer River, Tenn., 2889; Cumberland River, Tenn. and Ky., 2891.

PART V.

APPENDIX F F.

REPORT OF MAJ. DAN C. KINGMAN, CORPS OF ENGINEERS.

IMPROVEMENTS.—Tennessee River, 2907; operating and care of Muscle Shoals Canal, Tennessee River, 2934; French Broad River and Little Pigeon River, Tenn., 2944; Clinch River, Tenn. and Va., 2948; Elk River, Tenn. and Ala., 2952.

EXAMINATIONS AND SURVEYS.—Tennessee River at the "Suck," or mountain section, below Chattanooga, Tenn., 2956; Tennessee River at Moccasin Bend, below Chattanooga, Tenn., 3005; Tennessee River between Bridgeport and Decatur, Ala., 3008; Hiwassee River, Tenn., 3010; French Broad River, Tenn., 3018; Holston River, Tenn., 3058; Clinch River, Tenn., 3065; Powells River, Va. and Tenn., 3067; Richland River, Tenn., 3074; Elk River, Tenn. and Ala., 3077.

APPENDIX G G.

REPORT OF MAJ. W. H. BIXBY, CORPS OF ENGINEERS.

IMPROVEMENTS.—Ohio River, 3085; operating snag boat on the Ohio River, 3129; operating and care of Davis Island Dam, Ohio River, 3140; movable dams in Ohio River, 3146.

EXAMINATIONS AND SURVEYS.—Licking River, Ky., 3155; Ohio River from Mound City to Cairo, Ill., 3185; Ohio River at or near New Liberty, Ill., 3191; Ohio River from Marietta, Ohio, to mouth of Big Miami River, 3201; Ohio River at Madison, Ind., 3215; river bank at Paducah, Ky. (Tennessee River), 3219.

APPENDIX H H.

REPORT OF MAJ. CHAS. F. POWELL, CORPS OF ENGINEERS.

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APPENDIX I I.

REPORT OF CAPT. H. F. HODGES, CORPS OF ENGINEERS.

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EXAMINATIONS AND SURVEY.—Elk River, W. Va., 3392; Guyandot River, W. Va., 3396; Big Sandy River, W. Va. and Ky., including Levisa and Tug forks, 3400.

APPENDIX J J.

REPORT OF CAPT. GEO. A. ZINN, CORPS OF ENGINEERS.

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APPENDIX K K.

REPORT OF MAJ. CLINTON B. SEARS, CORPS OF ENGINEERS.

IMPROVEMENTS.—Harbor at Grand Marais, Minn., 3547; harbor at Agate Bay, Minn., 3551; harbor at Duluth, Minn., and Superior, Wis., 3554; harbor at Ashland, Wis., 3592; harbor at Ontonagon, Mich., 3595; waterway from Keweenaw Bay to Lake Superior, Mich., 3598; harbor at Marquette, Mich., 3606; harbor of refuge, Marquette Bay, Mich., 3608; harbor of refuge at Grand Marais, Mich., 3610.

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HARBOR LINES.—Duluth and Superior Harbor, Minn. and Wis., 3642.

APPENDIX L L.

REPORT OF CAPT. J. G. WARREN, CORPS OF ENGINEERS.

IMPROVEMENTS.—Menominee Harbor, Mich. and Wis., 3650; Menominee River, Mich. and Wis., 3653; Oconto Harbor, Wis., 3654; Green Bay Harbor, Wis., 3657; Sturgeon Bay and Lake Michigan Ship Canal, Wis., 3659; operating and care of Sturgeon Bay and Lake Michigan Ship Canal, Wis., 3666; harbor of refuge at entrance of Sturgeon Bay and Lake Michigan Ship Canal, Wis., 3672; Ahnapee Harbor, Wis., 3674; Kewaunee Harbor, Wis., 3679; Two Rivers Harbor, Wis., 3681; Manitowoc Harbor, Wis., 3683; Sheboygan Harbor, Wis., 3687; Port Washington Harbor, Wis., 3692; harbor of refuge at Milwaukee, Wis., 3695; Milwaukee Harbor, Wis., 3697; South Milwaukee Harbor, Wis., 3701; Racine Harbor, Wis., 3702; Kenosha Harbor, Wis., 3706; Waukegan Harbor, Ill., 3709; Fox River, Wis., 3712; operating and care of locks and dams on Fox River, Wis., 3721.

EXAMINATIONS AND SURVEYS.—Menominee River, Mich. and Wis., 3739; harbor at Oconto, Wis., 3745; Green Bay Harbor, Wis., 3747; harbor at Kewaunee, Wis., 3752; harbor at Two Rivers, Wis., 3759; Manitowoc Harbor, Wis., 3761; harbor at Port Washington, Wis., 3766; harbor at Kenosha, Wis., 3767; Waukegan Harbor, Ill., 3769.

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APPENDIX M M.

REPORT OF MAJ. J. H. WILLARD, CORPS OF ENGINEERS.

IMPROVEMENTS.—Chicago Harbor, Ill., 3779; Chicago River, Ill., 3784; Calumet Harbor, Ill., 3788; Calumet River, Ill. and Ind., 3792; Illinois River, Ill., 3798; operating and care of Lagrange and Kampsville Locks and Dams, Illinois River, 3805; Illinois and Mississippi Canal, 3810; operating and care of Illinois and Mississippi Canal (canal around lower rapids of Rock River, Ill.), 3853.

EXAMINATION AND SURVEY.—Upper Illinois and Lower Des Plaines rivers, Ill., 3855; Chicago River, Ill., 3863.

APPENDIX N N.

REPORT OF CAPT. CHESTER HARDING, CORPS OF ENGINEERS.

IMPROVEMENTS.—Michigan City Harbor, Ind., 3873; St. Joseph Harbor, Mich., 3879; St. Joseph River, Mich., 3883; South Haven Harbor, Mich., 3884; Saugatuck Harbor, Mich., 3887; Kalamazoo River, Mich., 3890; Holland (Black Lake) Harbor, Mich., 3891; Grand Haven Harbor, Mich., 3895; Grand River, Mich., 3899; Muskegon Harbor, Mich., 3905; White Lake Harbor, Mich., 3909; Pentwater Harbor, Mich., 3913; Ludington Harbor, Mich., 3916; Manistee Harbor, Mich., 3919; harbor of refuge at Portage Lake, Manistee County, Mich., 3922; Frankfort Harbor, Mich., 3925; Charlevoix Harbor, Mich., 3928; Petoskey Harbor, Mich., 3932; removing sunken vessels or craft obstructing or endangering navigation, 3933.

EXAMINATIONS.—Muskegon River, Mich., 3934; channel from Lake Michigan to Stony Lake, Mich., 3939; Arcadia, Mich., 3942.

PART VI

APPENDIX O O.

REPORT OF LIEUT. COL. G. J. LYDECKER, CORPS OF ENGINEERS.

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APPENDIX P P.

REPORT OF COL. JARED A. SMITH, CORPS OF ENGINEERS.

IMPROVEMENTS.—Monroe Harbor, Mich., 4019; Toledo Harbor, Ohio, 4022; Port Clinton Harbor, Ohio, 4038; Sandusky Harbor, Ohio, 4042; Huron Harbor, Ohio, 4051; Black River (Lorain) Harbor, Ohio, 4054; Cleveland Harbor, Ohio, 4063; Fairport Harbor, Ohio, 4070; Ashtabula Harbor, Ohio, 4075; breakwater construction at harbors on Lake Erie, 4084; Conneaut Harbor, Ohio, 4091; removing sunken vessels or craft obstructing or endangering navigation, 4094.

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REPORT OF MAJ. T. W. SYMONS, CORPS OF ENGINEERS.

IMPROVEMENTS.—Erie Harbor, Pa., 4099; harbor at Dunkirk, N. Y., 4108; Buffalo Harbor, N. Y., 4113; Buffalo entrance to Erie Basin and Black Rock Harbor, N. Y., 4135; Tonawanda Harbor and Niagara River, N. Y., 4138; Niagara River from Tonawanda to Port Day, N. Y., 4144.

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REPORT OF CAPT. GRAHAM D. FITCH, CORPS OF ENGINEERS.

Improvements.—Wilson Harbor, N. Y., 4161; harbor at Charlotte, N. Y., 4163; harbor at Pultneyville, N. Y., 4165; harbor at Great Sodus Bay, N. Y., 4166; harbor at Little Sodus Bay, N. Y., 4168; Oswego Harbor, N. Y., 4170; harbor at Cape Vincent, N. Y., 4173; shoals in the St. Lawrence River between Ogdensburg and foot of Lake Ontario, 4175; Ogdensburg Harbor, N. Y., 4177; removing sunken vessels or craft obstructing or endangering navigation, 4180.

APPENDIX S S.

REPORT OF CAPT. JAMES J. MEYLER, CORPS OF ENGINEERS.

Improvements.—San Diego Harbor, Cal., 4181; deep-water harbor at San Pedro Bay, Cal., 4187; Wilmington Harbor, Cal., 4191; San Luis Obispo Harbor, Cal., 4192.

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APPENDIX T T.

REPORT OF LIEUT. COL. WM. H. HEUER, CORPS OF ENGINEERS.

Improvements.—Alviso Harbor, Cal., 4213; San Francisco Harbor, Cal., 4215; Oakland Harbor, Cal., 4218; San Joaquin River, Cal., 4223; Mokelumne River, Cal., 4226; Sacramento and Feather rivers, Cal., 4227; Sacramento River, Cal., from Sacramento to the mouth, 4230; Napa River, Cal., 4234; Petaluna Creek, Cal., 4236; Humboldt Harbor and Bay, Cal., 4237.

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APPENDIX U U.

REPORT OF CAPT. WM. W. HARTS, CORPS OF ENGINEERS.

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REPORT OF CAPT. W. C. LANGFITT, CORPS OF ENGINEERS.

Improvements.—Long Tom River, Oreg., 4346; Willamette River above Portland, and Yamhill River, Oreg., 4347; Columbia and Lower Willamette rivers below Portland, Oreg., 4352; Columbia River, Oreg., below Tongue Point, 4360; mouth of Columbia River, Oreg. and Wash., 4361; Clatskanie River, Oreg., 4363; Lewis River, Wash., 4364; Cowlitz River, Wash., 4366; gauging Columbia River, Oreg. and Wash., 4368.

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G. L. Gillespie, colonel, Corps of Engineers, U. S. A., president; Amos Stickney, lieutenant-colonel, Corps of Engineers, U. S. A.; Thos. H. Handbury, major, Corps of Engineers, U. S. A.; Henry L. Marindin, assistant, United States Coast and Geodetic Survey; B. M. Harrod, Robert S. Taylor, and J. A. Ockerson, commissioners.

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Amos Stickney, lieutenant-colonel, Corps of Engineers, U. S. A., president; Thos. H. Handbury, major, Corps of Engineers, U. S. A.; W. L. Marshall, major, Corps of Engineers, U. S. A.; G. C. Broadhead, and C. L. Chaffee, commissioners.

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S. M. Mansfield, colonel, Corps of Engineers, U. S. A., president; Wm. H. Heuer, major, Corps of Engineers, U. S. A.; Herbert Deakyne, first lieutenant, Corps of Engineers, U. S. A., commissioners.

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UNITED STATES ARMY

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IMPROVEMENT OF RIVERS AND HARBORS IN MAINE EAST OF AND INCLUDING PORTLAND HARBOR.

REPORT OF MAJOR S. W. ROESSLER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

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3. Narraguagus River, Maine.
4. Breakwater from Mount Desert to Porcupine Island, Bar Harbor, Maine.
5. Harbor at Sullivan Falls, Maine.
6. Union River, Maine.
7. Bagaduce River, Maine.
8. Penobscot River, Maine.
9. Rockland Harbor, Maine.
10. Carvers Harbor, Vinal Haven, Maine.
11. Georges River, Maine.
12. Kennebec River, Maine.
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14. Removing sunken vessels or craft obstructing or endangering navigation.

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16. Bucksport Harbor, Maine.
17. Mouth of Kenduskeag River, Maine.
18. Camden Harbor, Maine.
19. Boothbay Harbor, Maine.
20. Kennebec River, Maine, between Gardiner and Augusta.
21. Parkers Head Harbor and Channel, Maine.

HARBOR LINES.

22. Rockland Harbor, Maine.

UNITED STATES ENGINEER OFFICE,
Portland, Me., July 16, 1900.

GENERAL: I have the honor to forward annual report for the fiscal year 1900, for river and harbor works in my charge.

* * * * * * *

Very respectfully, your obedient servant,
S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

A 1.

IMPROVEMENT OF LUBEC CHANNEL, MAINE.

The approved project and the report of progress of the work up to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 45.

The expenditures during the fiscal year were $97.04. Dredging, under contract with Augustus R. Wright, was commenced June 22, 1900, and by the close of the month 9,150 cubic yards of material were removed in widening the channel on its westerly side just above Lubec Narrows Light. It is expected that work under this contract will be completed during the present working season, with the result of widening the upper part of the entrance channel on the westerly side about 35 feet, and also increasing the width 67 feet on the easterly side of the lower part. This will leave a further widening of about 130 feet for a distance of about 3,500 feet on the easterly side of the lower part of the entrance channel to complete its proposed enlargement and the entire improvement as projected.

This channel is an international passage. The tidal currents are very strong and dense fogs prevail a large part of the time.

The widening of the channel benefits navigation principally by decreasing the chances of stranding and of collisions.

There is a light-house about 1 mile to the southward of Lubec, on the westerly side of the dredged channel. Lubec Narrows is in the collection district of Passamaquoddy.

Money statement.

July 1, 1899, balance unexpended		$26,050.25
June 30, 1900, amount expended during fiscal year		97.04
July 1, 1900, balance unexpended		25,953.21
July 1, 1900, outstanding liabilities	$108.55	
July 1, 1900, amount covered by uncompleted contracts	24,000.00	
		24,108.55
July 1, 1900, balance available		1,844.66
Amount (estimated) required for completion of existing project		53,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		53,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

March 3, 1879	$44,000
June 14, 1880	20,000
March 3, 1881	45,000
August 2, 1882	20,000
July 5, 1884	10,000
August 5, 1886	10,000
August 11, 1888	20,000
August 18, 1894	5,000
ugust 18, 1894, unexpended balance for improving St. Croix River, made available for Lubec Channel	35,000
June 3, 1896	32,000
March 3, 1899	25,000
Total	266,000

Contract in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Subject.	Prices.	Date of approval.	Beginning of work.	Expiration.
1	Augustus R. Wright, Portland, Me.	1899. July 3	Dredging Removing bowlders	25 cents per cubic yard. $5 per ton.	1899. July 19	1899. Oct. 1	1900. Oct. 31

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1896	52,300
1897	53,400
1898	87,000
1899:	
Brick	1,000
Coal	11,000
Fish	55,000
Flour and grain	3,200
Lead and tin	11,000
Lumber	12,000
Oil and mustard	7,000
Provisions	2,200
Potatoes	2,000
Salt	3.300
Sardines	19,000
Total	126,700

Arrivals and departures in calendar year 1899.

Steam vessels, extreme draft 17 feet	290
Sailing vessels, extreme draft 17 feet	300

A 2.

IMPROVEMENT OF MOOSABEC BAR, MAINE.

The approved project and the report of progress of the work up to June 30, 1899, will be found in the report of the Chief of Engineers for 1900, Part I, page 46.

The expenditures during the fiscal year 1900 were $11,470.05. Under a contract with Harries & Letteney 748.5 cubic yards of ledge were removed from the westerly approach to the dredged channel, thereby completing the entire project of improvement. Work was commenced August 4, 1899, and completed September 30, 1899.

The dredged channel through the bar was completed in 1889, and has been in constant use ever since. As no complaint has been received of vessels touching or grounding in it, it is altogether probable that no considerable shoaling has taken place, and it has not therefore been thought necessary to make an examination of the channel.

The project is completed.

The improvement is in the collection district of Machias, Me., which is the nearest port of entry. The nearest light-house is Moose Peak.

Money statement.

July 1, 1899, balance unexpended	$11,470.05
June 30, 1900, amount expended during fiscal year	11,470.05

APPROPRIATIONS.

March 3, 1881	$10,000	July 13, 1892	$15,000
August 2, 1882	10,000	August 18, 1894	6,000
July 5, 1884	10,000	June 3, 1896	12,000
August 5, 1886	10,000	March 3, 1899	11,000
August 11, 1888	15,000		
September 19, 1890	15,000	Total	114,000

Contract in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Subject.	Price per cubic yard situ.	Date of approval.	Beginning of work.	Expiration.
1	Harris & Letteney, Boston, Mass.	1899. July 10	Removing ledge	$14.70	1899. Aug. 15	1899. July 10	1899. Nov. 20

Contract completed.

COMMERCIAL STATISTICS.

The following letter in regard to vessels using the channel during the year 1899 is furnished by the deputy collector of customs at Jonesport, Me.:

JONESPORT, ME., *February 1, 1900.*

SIR: In reply to your letter of 22d ultimo, I have looked the matter up, and my estimate of questions asked is as follows:

Average draft vessels passing through Moosabec Reach:	Feet.
150 pile loaded, from foreign ports	13½
100 plaster loaded, from foreign ports	14
100 lumber loaded, from foreign ports	13½
50 general cargo, from foreign ports	10
50 stone loaded	13
100 lumber	13½
350 general cargo	10
100 fisherman	12
800 coastwise and in ballast	8½
25 coal laden	12½
375 trips passenger steamers.	
100 yachts of all classes.	

One small schooner built here of about 6 tons.

No new lines of transportation established.

Moosabec Reach is one of the best harbors on the coast and is accessible in all kinds of weather and winds at three different entrances—east, west, and south.

The total number of all classes of vessels passing through here annually must be nearly 2,500.

Respectfully submitted.

E. B. SAWYER,
Deputy Collector.

S. W. ROESSLER,
Major, Corps of Engineers.

A 3.

IMPROVEMENT OF NARRAGUAGUS RIVER, MAINE.

The approved project and the report of progress of the work up to June 30, 1899, will be found in the report of the Chief of Engineers for 1900, Part I, page 47.

The expenditures during the fiscal year 1900 were $5,032.90. A survey made in November, 1899, discovered the fact that considerable filling had taken place, especially in the turning basin in front of the new steamboat wharf and in the channel immediately below. It was therefore recommended that the available funds be used in redredging this area. This recommendation was approved by the Chief of Engineers, and a contract for the purpose was made with George E. Runyan and George Dillenback as executors of the estate of Augustus R. Wright, the successful bidder, who died suddenly two days after the bids were opened. Work was begun May 31 and completed June 16, 1900, during which time 30,000 cubic yards of material (mostly sawdust and mud) were removed in redredging to a depth of 11 feet at mean low tide the turning basin at the new steamboat wharf and the channel immediately below.

Practically the only boat using the dredged channel is a steamer plying between Portland and Machiasport and landing at the new steamboat wharf four times each week, for about eight months in the year. There is practically no navigation above the new steamboat wharf which a dredged channel would benefit, so that the project may now be regarded as complete, and no further appropriation is asked for at the present time.

The passing in and out of the steamboat has maintained the depth in the entrance channel fairly well, but filling in the turning basin will probably occur while existing conditions remain unchanged and, more especially, as long as sawdust and other mill waste are deposited in the river as at the present time.

The draft of the steamboat above referred to is between 9 and 10 feet.

The improvement is in the collection district of Machias. The nearest port of entry is Machias. The nearest light-house is Narraguagus Light-House, on Pond Island.

Money statement.

July 1, 1899, balance unexpended	$5,596.94
June 30, 1900, amount expended during fiscal year	5,032.90
July 1, 1900, balance unexpended	564.04
July 1, 1900, outstanding liabilities	52.50
July 1, 1900, balance available	511.54

APPROPRIATIONS.

For improvement above Millbridge:		
Act of March 3, 1871	$12,000	
Act of June 10, 1872	10,000	
		$22,000
For improvement below Millbridge:		
Act of August 5, 1886	10,000	
Act of August 11, 1888	10,000	
Act of September 19, 1890	7,500	
Act of July 13, 1892	7,500	
Act of August 18, 1894	5,000	
Act of June 3, 1896	5,000	
Act of March 3, 1899	5,000	
		50,000
Total		72,000

Abstract of proposals for dredging Narraguagus River, March 14, 1900.

No.	Name and address of bidder.	Price per cubic yard.	Commence.	Complete.
		Cents.		
1	Augustus R. Wright, Portland, Me.	15	90 days after notification of approval of contract.	30 days after commencement.

Contract in force during fiscal year ending June 30, 1900.

Name of contractors: George E. Runyan and George Dillenback, executors of the estate of Augustus R. Wright.

Date of contract: April 30, 1900.
Date of approval: May 29, 1900.
Time for commencement: August 29, 1900.
Time for completion: September 28, 1900.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.		Tons.
1891	48,959	1895	54,750
1892	45,300	1896	16,175
1893	60,875	1897	41,500
1894	95,600	1898	26,147

1899:	
Bricks	110
Blueberries and supplies	65
Coal	1,000
General merchandise	8,000
Lumber and cooperage	10,770
Iron and iron pipe	125
Laths	75
Lime and cement	75
Sardines and supplies	2,400
Shingles	25
Stone	400
Wood	500
Total	23,545

Arrivals and departures during calendar year 1899.

Steamers	250
Sailing vessels	400

Draft and tonnage not known.

A 4.

BREAKWATER FROM MOUNT DESERT TO PORCUPINE ISLAND, BAR HARBOR, MAINE.

The approved project and the report of progress of the work up to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 47.

The expenditures during the fiscal year 1900 were $5,504.17. Under contract with William S. White the work of depositing stone on and in continuation of the breakwater was begun April 28, and at the end of the fiscal year 13,898 tons of stone had been furnished and placed in the work. Most of this stone has been used in raising to full height and section the part of the old work which had settled or been lowered by the action of the waves. The length of the breakwater as built west of Dry Ledge is about 700 feet, and the total projected length of that portion is 1,440 feet.

The beneficial effects resulting from the portion of the breakwater already built in protecting the wharves at Bar Harbor and the anchorage basin are very appreciably felt.

The breakwater will require more or less extensive repairs until the side slopes have assumed an angle of rest against wave action.

The benefits to navigation are general in providing a harbor of refuge, and local in making it possible for boats to land at the wharves at all times with safety. The only practicable method of transportation to and from Bar Harbor is by boat.

Bar Harbor is in the collection district of Frenchman Bay. The nearest port of entry is Ellsworth. The nearest light-house is on Egg Rock, 3½ miles distant.

Money statement.

July 1, 1899, balance unexpended		$20,509.40
June 30, 1900, amount expended during fiscal year		5,504.17
July 1, 1900, balance unexpended		15,005.23
July 1, 1900, outstanding liabilities	$729.07	
July 1, 1900, amount covered by uncompleted contracts	12,709.26	
		13,438.33
July 1, 1900, balance available		1,566.90
Amount (estimated) required for completion of existing project		230,200.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		100,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

August 11, 1888	$50,000	June 3, 1896	$10,000
September 19, 1890	50,000	March 3, 1899	20,000
July 13, 1892	50,000		
August 18, 1894	10,000	Total	190,000

Abstract of proposals for placing stone in breakwater, January 30, 1900.

No.	Name and address of bidder.	Price per ton.	Commence.	Complete.
		Cents.		
1	Harries & Letteney, Boston, Mass	92	June 1, 1900	Dec. 30, 1900
a2	William S. White, Rockland, Me	78	May 1, 1900	Nov. 30, 1900
3	Cleaves & Hamilton, Chebeague, Me	83½	Apr. 15, 1900	Oct. 15, 1900

[a] Contract made with William S. White.

Contract in force during fiscal year ending June 30, 1900.

Name of contractor: William S. White.
Date of contract: February 17, 1900.
Date of approval: March 5, 1900.
Time for commencement: May 11, 1900.
Time for completion: December 11, 1900.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1898	22,175

Detailed statistics could not be obtained, but it has been estimated by parties in interest that about 10 per cent should be added to report for 1898, which would give a total of 24,393 tons.

A 5.

IMPROVEMENT OF HARBOR AT SULLIVAN FALLS, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 48.

The expenditures during the fiscal year 1900 were $4,701.20. Removal of ledge, by contract in continuation of improvement, was begun in August, 1899, and completed October 25, 1899, during which time 184.3 cubic yards of ledge were removed. The removal of Hatchers Rock to a depth of 10 feet at mean low tide was completed, and a part of the outer end of ledge "C" was taken off to the same depth.

The improvement not only increases the navigable depth, but also, by removing the cause of eddies and cross currents, has added to the length of time at each high and low tide during which vessels may pass through the rapids with safety.

The improvement may be regarded as permanent.

Sullivan Falls is in the collection district of Frenchman Bay. The nearest lighthouse is Crabtree Ledge Light Station.

Money statement.

July 1, 1899, balance unexpended	$5,165.89
June 30, 1900, amount expended during fiscal year	4,701.20
July 1, 1900, balance unexpended	464.69
Amount (estimated) required for completion of existing project	25,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	15,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Act of March 3, 1871	$10,000	
Act of June 10, 1872	25,000	
		$35,000
Act of June 3, 1896	5,000	
Act of March 3, 1899	5,000	
		10,000
Total		45,000

Contract in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Subject.	Price per cubic yard, situ.	Date of approval.	Beginning of work.	Expiration.
1	H. Herbert Sturgis	1899. July 17	Removing ledge	$25.00	1899. July 22	1899. Aug. 1	1900. Aug. 1

Contract completed.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1896	51,290
1897	50,790
1898	41,700
1899:	
Coal	325
Granite and paving blocks	40,000
General merchandise	1,200
Lumber and wood	600
Total	42,125

Arrivals and departures during calendar year 1899.

Sailing vessels:	
Average 235 tons, drawing 10 feet or more	170
Average 50 tons, drawing less than 10 feet	12
Steamer, average 270 tons	1

A 6.

IMPROVEMENT OF UNION RIVER, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the report of the Chief of Engineers for 1900, Part I, page 49.

The item in the river and harbor act of March 3, 1899, which provides for the completion of the project under continuous contract, evidently referred to the report and estimate submitted in compliance with the river and harbor act of August 11, 1888, with the training wall at the mouth of the river, therein proposed, omitted. As this change would necessitate dredging at the mouth of the river, and as the discovery of ledge in the proposed channel and the probability of additional filling had changed the condition then existing, a new survey was considered necessary. This survey was made in May, 1899, and report, with maps and estimates, submitted June 16, 1899. (See Report of Chief of Engineers for 1899, Appendix A, pp. 1026 et seq.)

The estimate then submitted was to obtain, entirely by dredging and ledge excavation, a channel 6 feet deep at mean low water, with width in straight sections varying from 200 feet to 100 feet, from the mouth of the river to the wharves at Ellsworth. This estimate for expenditure of funds for completion of the improvement was approved by the Secretary of War June 28, 1899.

The expenditures during the fiscal year 1900 were $587.19. A contract for completion of the entire work was made with Augustus R. Wright October 16, 1899.

This contract required that the expenditure of the $15,000, made available by the river and harbor act of March 3, 1899, should be applied to dredging a channel through the bar of sawmill waste near the head of navigation, said channel to be of smaller dimensions, but embraced within the limits of the channel when completed in accordance with the approved plan of improvement, and that this part of the work should be completed on or before August 1, 1900. Dredging of this channel is now in progress, but, owing to late freshets, was not commenced until May 26.

As the balance of the funds ($115,000) necessary for the completion of the whole improvement has been made available by the sundry civil act of June 6, 1900, it was recommended, June 29, 1900, that the completion of this smaller channel separately, both as to manner of doing the work and time of completion, be abandoned and the whole work carried on under the general terms of the contract, the time of completion being not later than December 31, 1901. This recommendation was approved by the Chief of Engineers July 6, 1900.

Work was begun May 26, 1900, and from that time to the close of the fiscal year 10,938 cubic yards of material, almost entirely slabs, edgings, and sawdust, were removed from a section of channel 90 feet wide, about 900 feet long, and about 4 feet deep, beginning a short distance above the narrows and working upstream.

The progress of the dredging is very slow, and the ledge excavation has not been commenced.

The benefits of the improvement will be in giving more economical facilities for shipping to and from Ellsworth by water, principally coal in, and sawmill products out.

The improvement can not be regarded as permanent, as the masses of slabs and edgings and sawdust now within the banks of the river will gradually work into the channel and necessitate redredging. At the mills on the river, above the head of navigation, all the short sawdust and a part of the other waste materials go into the stream.

The draft of vessels using the river will be governed by the channel depth which obtains when the improvement is completed.

Union River is in the collection district of Frenchman Bay. The nearest lighthouse is Blue Hill Bay light.

Money statement.

July 1, 1899, balance unexpended		$14,875.13
Amount appropriated by sundry civil act approved June 6, 1900		115,000.00
		129,875.13
June 30, 1900, amount expended during fiscal year		587.19
July 1, 1900, balance unexpended		129,287.94
July 1, 1900, outstanding liabilities	$307.50	
July 1, 1900, amount covered by uncompleted contracts	119,890.00	
		120,197.50
July 1, 1900, balance available		9,090.44

APPROPRIATIONS.

July 11, 1870	$15,000	
March 3, 1871	15,000	
		$30,000
June 3, 1896	15,000	
March 3, 1899	15,000	
June 6, 1900	115,000	
		145,000
Total		175,000

Abstract of proposals for dredging and ledge excavation, September 7, 1899.

No.	Name and address of bidder.	Price per cubic yard in scow.			Excavation of ledge, 8,600 cubic yards. (Price per cubic yard in place.)	Amount.	Commence.	Complete preliminary channel.
		Dredging mill waste and all other than compact gravel, hardpan, and bowlders. 137,000 cubic yards.	Dredging compact gravel or hardpan and bowlders, not more than 5 tons each. 30,000 cubic yards.	Dredging at mouth of river. 45,000 cubic yards.				
		Cents.	*Cents.*	*Cents.*			1900.	
1	Augustus B. Martin, Boston, Mass.	36	81	37	......	$90,270	May 1	Depend on appropriation.
2	George A. Rogers, Plattsburg, N. Y.	......	......	......	$7.89	67,854	......	
3	Alabama Dredging and Jetty Co., Mobile, Ala.	......	......	......	......	......	......	
4	Simon J. Donovan, Winthrop, Mass.	......	......	......	10.25	88,150	......	
5	International Wrecking, Salvage and Submarine Co., Atlantic City, N. J.	35	98	25	7.65	154,390	May 1	Oct. 1, 1901.
a6	Augustus R. Wright, Portland, Me.	25	75	18	6.40	119,890	Apr. 1	Aug. 1, 1900.
7	Charles W. Johnston, Lewes, Del.	27	47	16	7.90	126,230	May 1	July 1, 1900.

[a] Contract made with Augustus R. Wright.

Contract in force during the fiscal year ending June 30, 1900.

Name of contractor: Augustus R. Wright.
Date of contract: October 16, 1899.
Date of approval: November 6, 1899.
Time for commencement: April 1, 1900.
Time for completion: In season of 1901, should funds be appropriated.
For list of prices, see Abstract of proposals.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1896	54,000
1897	57,685
1898	50,462
1899:	
Bricks	750
Cement and lime	200
Coal	3,000
Cooperage	21,200
Fish	200
General merchandise	5,000
Gravel	200
Hardware and iron	300
Lumber, laths, and shingles	15,440
Powder	10
Wood	3,500
Total	49,800

Arrivals and departures during calendar year 1899.

Steam and sailing vessels, average draft 10 feet, average tonnage 150 tons	550

There are three lines of steamers and one tugboat plying on the river.

A 7.

IMPROVEMENT OF BAGADUCE RIVER, MAINE.

The approved project and report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 51.

The expenditures during the fiscal year 1900 were $129.45. Removal of rocks and bowlders at Winslows Island, under contract with Townsend & Olsen, was commenced June 15; but progress was very slow, and by the close of the fiscal year only 83 tons had been removed.

The improvement when completed will be fairly permanent, except that a gradual washing into the dredged channel of soft mud from the flats on either side will cause some shoaling.

The small sailing vessels now landing at South Penobscot do not use the new channel, on account of the ledges at Winslows Island, and can therefore go in or out at high water drawing not more than about 8 feet. Vessels drawing 12 to 14 feet could pass in and out at high water should the improvement be completed.

The improvement is in the collection district of Castine. The nearest port of entry is Castine, at the mouth of the river. The nearest light-house is at Dice Head.

Money statement.

July 1, 1899, balance unexpended		$3, 209. 82
June 30, 1900, amount expended during fiscal year		129. 45
July 1, 1900, balance unexpended		3, 080. 37
July 1, 1900, outstanding liabilities	$143. 65	
July 1, 1900, amount covered by uncompleted contracts	2, 800. 00	
		2, 943. 65
July 1, 1900, balance available		136. 72
Amount (estimated) required for completion of existing project		21, 875. 00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		21, 875. 00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

August 11, 1888	$3, 000	June 3, 1896	$5, 000
September 19, 1890	4, 000	March 3, 1899	3, 000
July 13, 1892	5, 000		
August 18, 1894	5, 000	Total	25, 000

Abstract of proposals for removing rocks and bowlders, April 12, 1900.

No.	Name and address of bidder.	Price per ton 2,000 pounds.	Commence after notification of approval of contract.	Complete after notification of approval of contract.
1	Harries & Letteney, Boston, Mass	$4. 20	10 days	30 days.
2	Townsend & Olsen, Boston, Mass	1. 59	June 1, 1900	90 days.
3	Charles W. Johnston, Lewes, Del	9. 24	15 days	Do.
4	Robert H. Rogers, Plattsburg, N. Y	4. 21	do	45 days.
5	George A. Rogers, Plattsburg, N. Y	5. 00	30 days	Aug. 1, 1900.
6	Denis Toomey, Guilford, Conn	11. 90	20 days	50 days.
7	H. Herbert Sturgis, South Standish, Me	5. 22	30 days	90 days.

Contract made with Townsend & Olsen.

Contract in force during fiscal year ending June 30, 1900.

Name of contractor: Townsend & Olsen.
Date of contract: May 7, 1900.
Date of approval: May 21, 1900.
Time for commencement: June 24, 1900.
Time for completion: September 22, 1900.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.		Tons.
1891	41, 300	1895	85, 900
1892	46, 100	1896	78, 050
1893	49, 300	1897	86, 600
1894	67, 850	1898	79, 965

Receipts and shipments—Continued.

1899:	Tons.
Bricks	8,000
Coal	2,500
Cod and mackerel lines	300
Cotton	350
Farm produce	350
Fish	300
General merchandise	25,000
Grain	12,000
Granite	6,000
Lumber and cooperage	16,500
Lime, cement, etc	11,000
Phosphate	200
Wood	7,000
Total	89,500

Arrivals and departures during calendar year 1899.

Steamers:	
Drawing 10 feet or more, 500 to 1,500 tons	250
Drawing less than 10 feet, 5 to 250 tons	1,200
Sailing vessels:	
Drawing 10 feet or more, 150 to 400 tons	200
Drawing less than 10 feet, 5 to 150 tons	500
Steam tugs plying on the river	1

Most of the above is landed and shipped from Castine, at the mouth of the river. Only about 15,175 tons applies directly to the locality under improvement.

A 8.

IMPROVEMENT OF PENOBSCOT RIVER, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the report of the Chief of Engineers for 1900, Part I, page 52.

The expenditures during the fiscal year 1900 were $611.77. No work was done under the general project for improving Penobscot River.

By act of March 3, 1899, Congress appropriated $28,000 for completing an improvement in the Penobscot River at Bangor, in accordance with project submitted May 3, 1897.

The detailed plan of improvement under the project of May 3, 1897, as approved by the Secretary of War May 18, 1899, contemplates dredging at the mouth of the Kenduskeag and through both draws of the railroad bridge and within the basin between the latter bridge and the post-office bridge, so as to obtain a uniform depth of about 1 foot above extreme low water (or 2 feet below mean low water) to within 30 feet of the wharves.

The same project also provides for deepening the harbor of Bangor in front of the Boston and Bangor Steamboat Wharf by the excavation of ledge to a depth of 11 feet at extreme low tide.

A contract has been entered into with Harries & Letteney for the work at both points at $7.65 per cubic yard for ledge excavation, and 28.7 cents per cubic yard for dredging.

Work was commenced at both places June 22, 1900. Up to the close of the fiscal year 1,986 cubic yards of material had been dredged from the Kenduskeag, and a small portion of the ledge had been drilled and blasted. It is believed that the contract will be completed before the end of the fiscal year ending June 30, 1901.

Preliminary examinations of Bucksport Harbor and of Penobscot River at and near Bucksport Narrows, authorized by the river and harbor act of March 3, 1899, were made during the year and the results published as House Ex. Docs. No. 275 and 61, Fifty-sixth Congress, first session.

A survey of the Penobscot River in the vicinity of Sterns's mill, below Bangor, has been made and a report and plan of survey submitted to the Chief of Engineers on December 13, 1899.

The result of this survey shows that the condition of the river at this locality has not perceptibly changed since the completion of the improvements made in 1892; that the river has deepened in many places, and that for purposes of general navigation the river channel is adequate.

Money statement.

July 1, 1899, balance unexpended		$36,977.64
June 30, 1900, amount expended during fiscal year		611.77
July 1, 1900, balance unexpended		36,365.87
July 1, 1900, outstanding liabilities	$62.50	
July 1, 1900, amount covered by uncompleted contracts	25,248.75	
		25,311.25
July 1, 1900, balance available		11,054.62

APPROPRIATIONS.

March 2, 1829 (for survey)	$300
July 11, 1870 (at Bangor and below)	15,000
March 3, 1871 (at Bangor and below)	50,000
June 10, 1872	40,000
March 3, 1873	20,000
June 23, 1874	20,000
March 3, 1875 ($10,000 to be expended at or near Bucksport Narrows)	25,000
August 14, 1876 ($4,000 to be expended at or near Bucksport Narrows)	10,000
June 18, 1878 ($2,500, or so much thereof as necessary, to be expended at or near Bucksport Narrows)	12,000
March 3, 1879	6,000
July 5, 1884 (for Bangor Harbor and Penobscot River)	20,000
August 5, 1886 (for widening channel at Bangor and removing obstructions near Crosbys Narrows)	15,000
August 11, 1888 ($20,000 to be expended between Bangor and Crosbys Narrows and $30,000 between Bucksport and Winterport)	50,000
September 19, 1890 (for continuing improvement and for dredging near Sterns's mill)	25,000
July 13, 1892	40,000
March 3, 1899	28,000
Total	376,300

Abstract of proposals for dredging and removing ledge, October 24, 1899.

No.	Name and address of bidder.	Kenduskeag stream.			Removing ledge steamboat wharf.	Amount.	Commence.	Complete.
		Dredging 30,000 cubic yards (per cubic yard).	Bowlders (per cubic yard).	Ledge (per cubic yard).	2,175 cubic yards (per cubic yard).			
		Cents.						
1	George A. Rogers, Plattsburg, N. Y.	....	....	....	$8.42	$18,313.50	1900. June 1	1901. June 30
2	Dunbar & Sullivan, Buffalo, N. Y.	....	....	....	8.00	17,400.00	May 1	1900. Sept. 30
a3	Harries & Letteney, Boston, Mass	28.7	$12	$15	7.65	25,248.75	May 15	Nov. 30
4	Augustus R. Wright, Portland, Me	43	5	5	....	12,900.00	May 1	Oct. 31

a Contract with Harries & Letteney.

Contract in force during fiscal year ending June 30, 1900.

Name of contractor: Harries & Letteney.
Date of contract: November 20, 1899.
Date of approval: December 11, 1899.
Time for commencement: May 15, 1900.
Time for completion: November 30, 1900.
For prices see abstract of proposals.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.		Tons.
1891	931,780	1895	617,859
1892	714,935	1896	715,911
1893	565,887	1897	790,698
1894	750,313	1898	639,671

1899:

Box shooks	10,020
Bricks	1,192
Coal	220,307
General merchandise	27,335
Grain and flour	9,992
Hay	1,470
Ice	56,193
Iron and steel	2,582
Lime and cement	12,979
Lumber and wood	275,256
Miscellaneous	2,902
Oil	4,045
Paving blocks and stone	13,248
Phosphate	1,975
Salt	1,888
Sand, clay, and ashes	1,790
Spool bars	13,364
Sulphur	2,094
Total	658,632

Arrivals and departures in calendar year 1899.

Steamers:	
Foreign, average tonnage 1,500	16
Coastwise, draft and tonnage not given	668
Sailing vessels:	
Foreign, average tonnage 360	51
Coastwise	2,659

A 9.

IMPROVEMENT OF HARBOR AT ROCKLAND, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 54.

The expenditures during the fiscal year 1900 were $189,352.47. The operations consisted in the extension of the breakwater, under contract with Charles H. Souther; dredging, under contract with Moore & Wright; ledge excavation, under contract with Dunbar & Sullivan, and raising the inner end of the breakwater and building a cap its entire length, under contract with Romano V. Perini.

In the original project of 1881 the height of the breakwater thought to be necessary to afford needed protection was 4 feet above mean high tide, and as from recent observations it has been found that a less height did not give satisfactory results, it has been recommended that the top of the breakwater be raised to 4 feet above mean high tide. This recommendation and slight modification of the project was approved by the Chief of Engineers March 1, 1900, with the proviso that it can be done without additional appropriation.

Under the contract with Charles H. Souther the breakwater has been extended seaward as far as projected. Its top length is now about 4,140 feet from the present shore end, of which 422 feet at the inner end is built only to half tide, and for the balance of the distance the top is 20 feet wide and about at the level of mean high tide. Work under this contract was completed November 24, 1899, 100,455 tons of stone having been placed in the work during the fiscal year, and a total of 415,087 tons under the contract. The length of the extension under the contract was 1,599 feet.

Under the contract with Moore & Wright dredging was continued in the part of the area to be made 6 feet deep at mean low tide north of Crocketts Point until November 14, 1899, when ledge was encountered above the required depth. Operations were then suspended until the necessary arrangements could be made to meet the changed conditions. It has been recommended that the depth over the inner part of the 6 feet area be decreased to 4 feet at mean low tide, and that for this part of the work the contractor be paid 17 cents per cubic yard, place measurement (or 3 cents more per cubic yard than the original contract price), the change of price to be covered by a supplemental agreement. This recommendation was approved by the Secretary of War May 22, 1900, and a supplemental agreement embodying this modification was also approved July 11, 1900. It is also proposed to remove to a depth of 7 feet, or 1 foot below the surrounding bottom, the portion of ledge discovered in the area already dredged to a depth of 6 feet at mean low tide, at an estimated cost of $11,800, being 1,475 cubic yards at $8 per yard. Dredging was resumed June 27, 1900, in a small part of the area not affected by the change of depth.

The total amount dredged during the fiscal year was 134,569 cubic yards, measured in place.

A contract, dated June 2, 1900, was entered into with Romano V. Perini to raise the inner end of the breakwater to full section, with top at level of mean high water, and to build a cap 16 feet wide and about 4 feet high the entire length of the breakwater with stone blocks weighing not less than 6 tons each. The length of the breakwater on top, when fully completed, will be about 4,356 feet, the additional length being caused by its extension shoreward. The contractor has three large lighters and a tugboat at work. He has reopened the quarry on Bald Island and began the delivery of stone June 28, 1900, 524 tons of stone being placed in the breakwater up to the end of the fiscal year.

Under contract with Dunbar & Sullivan 12,702 cubic yards have been removed from Ledges "D" and "E," and 1,900 cubic yards from Ledge "B." Ledge "E" is practically completed to a depth of 22 feet at mean low tide; good progress has been made in drilling and blasting Ledge "D," but only a small part of the material has been taken up, and the dredge has been at work removing the hardpan and bowlders from the top of Ledge "B."

Owing to the discovery of ledge, slight changes of the established harbor lines became necessary at Crocketts Point and at the head of the north cove. Also, upon petition of parties interested in the commerce of the harbor, another slight change was deemed advisable from Perry Brothers' wharf to and a short distance beyond Bird's wharf. These changes in the established harbor lines were approved by the Secretary of War May 17, 1900.

The benefits resulting from these improvements are considerable. The construction of the breakwater will afford a safe and extensive anchorage and harbor of refuge; the excavation of ledges will increase the available anchorage area and remove dangerous obstructions to boats in motion; and the dredging will afford access to vessels of greater draft to the wharves when built out to the harbor lines.

The improvements are of a permanent character, with the possible exception that filling may gradually take place in the dredged areas.

Rockland is in the collection district of Waldoboro. There is a light on the end of the breakwater.

Money statement.

July 1, 1899, balance unexpended		$481,821.45
June 30, 1900, amount expended during fiscal year		189,352.47
July 1, 1900, balance unexpended		292,468.98
July 1, 1900, outstanding liabilities	$12,804.98	
July 1, 1900, amount covered by uncompleted contracts	187,949.14	
		200,754.12
July 1, 1900, balance available		91,714.86

APPROPRIATIONS.

June 14, 1880	$20,000	August 18, 1894	$30,000
August 2, 1882	40,000	June 3, 1896	25,500
July 5, 1884	40,000	June 4, 1897	350,000
August 5, 1886	22,500	July 1, 1898	300,000
August 11, 1888	30,000		
September 19, 1890	37,500	Total	925,500
July 13, 1892	30,000		

Abstract of proposals for placing stone in breakwater, May 10, 1900.

No.	Name and address of bidder.	Riprap stone (estimated) 17,000 tons.		Capstone (estimated) 18,000 tons.		Total.	Commence after notification of approval of contract.	Complete after notification of approval of contract.
		Price per ton.	Amount.	Price per ton.	Amount.			
							Days.	
1	Aaron Cleaves and Sylvester I. Hill, Chebeague, Me.	$1.04	$17,680	$2.56	$46,080	$63,760	10	13 months.
2	William S. White, Rockland, Me.	.95	16,150	2.52½	45,450	61,600	30	July 1, 1901.
3	Romano V. Perini, Wilmington, Del.	1.49	25,330	1.49	26,820	52,150	30	12 months.

List of contracts in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Subject.	Prices.	Date of approval.	Beginning of work.	Expiration.
a1	Charles H. Souther, Boston, Mass.	1897. May 4	Constructing breakwater.	59.2 cents per ton for stone.	1897. May 24	1897. June 1	1899. Nov. 15
b2	Moore & Wright, Portland, Me.	1898. May 16	Dredging.....	14 cents per cubic yard.	1898. June 8	1898. June 6	1900. Oct. 1
			Removing bowlders.	$5 per ton.			
3	Dunbar & Sullivan, Buffalo, N. Y.	July 9	Removing ledges.	$6.75 per cubic yard, Ledges A, B, and C; $5.25 per cubic yard, Ledges D and E.	Aug. 22	Sept. 1	Dec. 1
4	Romano V. Perini, Wilmington, Del.	1900. June 2	Raising breakwater.	$1.49 per ton..	1900. June 18	1900. July 20	1901. July 19

a Contract completed.
b 17 cents for part of the work covered by modified agreement.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.		Tons.
1891	433,760	1895	615,830
1892	526,805	1896	580,295
1893	538,506	1897	594,992
1894	509,853	1898	579,300

1899:

	Tons.
Brick, cement, and sand	31,000
Coal	65,000
Fish and salt	15,000
Grain and flour	13,500
General merchandise	75,000
Hay and straw	600
Ice	6,000
Lumber and ship timbers	30,000
Lime	150,000
Oil	700
Stone	311,349
Sawdust and ashes	5,000
Steel rail, ironwork, and castings	2,500
Wood and cooperage	50,000
Total	755,649

Arrivals and departures in calendar year 1899.

Steamers:	
Coastwise, 400 to 1,500 tons, average	388
Coastwise, 25 to 400 tons, average	2,176
Coastwise, under 25 tons	280
Sailing vessels:	
Foreign, 90 tons, average	165
Coastwise, draft and tonnage not stated	4,200
For refuge	1,200

A 10.

IMPROVEMENT OF CARVERS HARBOR, VINALHAVEN, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 56.

The expenditures during the fiscal year 1900 were $14,540.19. Dredging, under contract with Augustus R. Wright, was begun April 10 and completed May 26, 1900, during which time 97,014 cubic yards of material were removed. This completed about 14 acres of the proposed area of 23 acres to be dredged as a harbor of refuge, and about 50 per cent of the amount of material to be removed therefrom.

Ledge was discovered about 3 feet above the required depth near the upper end and on both sides of the area dredged under this contract. A rock with its top only 7½ feet below mean low tide was discovered near the upper corner of the steamboat wharf while dredging was in progress under the previous contract.

It is proposed to make an examination to ascertain more definitely the character of the material remaining to be removed, and the extent of the underlying ledge.

The improvement, it is believed, will be fairly permanent, and will be of benefit to navigation in affording a harbor of refuge and increased facilities for reaching the wharves.

Carvers Harbor is in the collection district of Belfast. The nearest light-house is Heron Neck.

Money statement.

July 1, 1899, balance unexpended	$15,329.05
June 30, 1900, amount expended during fiscal year	14,540.19
July 1, 1900, balance unexpended	788.86
July 1, 1900, outstanding liabilities	5.00
July 1, 1900, balance available	783.86
Amount (estimated) required for completion of existing project	39,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	39,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

June 3, 1896	$10,000
March 3, 1899	15,000
Total	25,000

Abstract of proposals for dredging, July 7, 1899.

No.	Name and address of bidder.	120,000 cubic yards dredging measured in scow (per cubic yard).	Bowlders (per ton 2,000 pounds).	Amount.	Commence.	Complete.
		Cents.			1900.	1900.
1	Charles H. Souther, Boston, Mass	14.80	$6	$17,760	Mar. 1	July 1
a2	Augustus R. Wright, Portland, Me	14.5	5	17,400	Apr. 1	June 30

a Contract made with Augustus R. Wright.

Contract in force during the fiscal year ending June 30, 1900.

Name of contractor: Augustus R. Wright.
Date of contract: July 19, 1899.
Date of approval: August 2, 1899.
Time for commencement: April 1, 1900.
Time for completion: June 30, 1900.
For list of prices see abstract of proposals.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1896	63,078
1897	63,704
1898	60,000
1899:	
Coal, hay, wood, lumber, and general merchandise	8,350
Fish, salt, ice, bait, etc	12,500
Lobsters	500
Stone	42,040
Total	63,390

Arrivals and departures in calendar year 1899.

Steamers:	
Average draft 8 feet, 120 tons	1,200
Average draft 6 feet, tonnage not given	270
Sailing vessels:	
Draft 9 to 18 feet, 100 to 400 tons	175
Draft 7 to 14 feet, 7 to 200 tons	620
For refuge	475

A II.

IMPROVEMENT OF GEORGES RIVER, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 57.

The expenditures during the fiscal year 1900 were $10,058.76. Under contract with Hamilton & Sawyer, dredging was begun July

21 and completed October 21, 1899. During this time 56,997 cubic yards of material, measured in scows, were removed, completing to the required depth of 16 feet, and to full width, a channel length of about 1,650 feet, and making the total length of channel now completed about 3,600 feet. There remains to be dredged a strip of channel about 90 feet wide and 900 feet long, requiring the removal of about 16,000 cubic yards of material in scows. This, with the repair of the stone beacon, will complete the entire project.

Owing to the small amount of material remaining to be dredged, it is probable that the price per cubic yard will be relatively large, and is estimated at 30 cents. As the stone beacon is in a much more dilapidated condition than at the time the survey was made, its repair will cost more than then estimated.

The revised estimate for the completion of the approved project is therefore given as follows:

Dredging 16,000 cubic yards of material, in scows, at 30 cents	$4,800
Repairing stone beacon	400
Contingencies, engineering, etc	800
Total	6,000

This is $4,000 less than the amount required to complete the project according to the original estimate, but being regarded as sufficient for the purpose is all that is asked for at the present time.

Material brought down by the river during freshets will doubtless cause shoaling in the channel, but the process will be slow and a depth sufficient to accommodate the traffic will probably be maintained for a number of years.

The depth of the dredged channel is such that the vessels using it could be towed out at any stage of tide; but as the business does not seem to warrant the maintenance of a tugboat, they have to wait until near high water and a favorable wind in order to go out or in, under sail, with safety.

Georges River is in the collection district of Waldoboro. The nearest light-house is Franklin Island.

Money statement.

July 1, 1899, balance unexpended	$10,271.38
June 30, 1900, amount expended during fiscal year	10,058.76
July 1, 1900, balance unexpended	212.62
Amount (estimated) required for completion of existing project	6,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	6,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Act of June 3, 1896	$10,000
Act of March 3, 1899	10,000
Total	20,000

Contract in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Subject (70,000 cubic yards in scow).	Per cubic yard.	Date of approval.	Beginning of work.	Expiration.
		1899.		*Cents.*	1899.	1899.	1900.
1	Hamilton & Sawyer, Chebeague, Me.	July 1	Dredging channel	16¼	July 10	Aug. 1	Aug. 1

Contract completed.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1896	45,375
1897	64,250
1898	59,000
1899:	
Cement, general merchandise, etc	3,000
Coal	7,000
Lime	28,000
Lumber and ship timbers	9,000
Wood	13,000
Total	60,000

Arrivals and departures in calendar year 1899.

Sailing vessels, foreign, 300 tons and over	20
Coastwise from 75 to 300 tons and over	320
Barges, 25 to 50 tons and over	40
Steam tugs	10
Vessels built during the year 1899, 1,100 to 1,400 tons	2
Vessels in process of construction	2

A 12.

IMPROVEMENT OF KENNEBEC RIVER, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 58.

The expenditures during the fiscal year 1900 were $1,156.59. The only operations consisted in making an examination and survey of the river between Gardiner Bridge and Augusta Dam, as ordered by the river and harbor act of March 3, 1899. The report on this survey was forwarded December 19, 1899, and is printed in House Doc. No. 262, Fifty-sixth Congress, first session. The project therein contained has not as yet been acted upon by Congress.

The dredged channel, especially between Gardiner and Augusta, has been found to fill more or less rapidly, probably with material brought down during heavy spring freshets. The parts of the improvement consisting of the removal of ledge are, of course, permanent. Vessels drawing 14 to 16 feet can get up as far as Gardiner at high tide, but only 11 or 12 feet can be carried to Augusta.

No further appropriation is now asked for, as, unless new conditions develop, the funds already appropriated are sufficient for completion of the existing project.

The improvement is in the collection district of Bath, of which Bath is the port of entry. Fort Popham and the light-house on Pond Island are near the mouth of the river.

Money statement.

July 1, 1899, balance unexpended	$28,845.80
June 30, 1900, amount expended during fiscal year	1,156.59
July 1, 1900, balance unexpended	27,689.21

APPROPRIATIONS.

March 2, 1827	$4,000	June 23, 1874	$12,000
March 19, 1828	3,500	March 3, 1875	15,000
April 23, 1830	5,000	March 3, 1881	10,000
August 30, 1852	6,000	August 11, 1888	75,000
June 23, 1866	20,000	September 19, 1890	50,000
March 2, 1867	30,000	July 13, 1892	100,000
April 10, 1869	14,850	August 18, 1894	50,000
July 11, 1870	15,000	June 3, 1896	55,000
March 3, 1871	15,000		
June 10, 1872	8,000	Total	500,350
March 3, 1873	12,000		

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.		Tons.
1891	1,210,474	1895	1,162,972
1892	1,263,145	1897	665,991
1893	970,938	1898	1,211,808
1894	1,207,965		

1899:	
Brick	675
Cement and plaster	1,272
Coal	101,433
General merchandise	25,937
Granite and feldspar	5,100
Hay and straw	600
Ice	525,900
Lumber	39,117
Pulp and paper	1,546
Sand	3,100
Ship timbers	2,004
Steel and iron	5,165
Wood	2,350
Total	714,199

Arrivals and departures in calendar year 1899.

Steamers:	
Coastwise, about 1,600 tons; draft, 18 feet	560
Coastwise, about 100 tons; draft, 12 feet	720
Sailing vessels:	
Foreign, 100 tons; draft, about 9 feet	28
Coastwise, average, 800 tons; draft, 13 feet	1,100
Tugs plying on the river	10
Ferryboats	2
Vessels built during the year (total, 28,689 tons)	29

A 13.

IMPROVEMENT OF PORTLAND HARBOR, MAINE.

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 60.

At the beginning of the fiscal year dredging by George M. Valentine & Co. was in suspension and that under the arrangement with Mr. A. R. Wright was in progress. Mr. Wright's dredges continued work till the contract expired, on November 30, 1899, since which date no dredging has been done.

The time for completing their contract with George M. Valentine & Co. as extended having expired by limitation on November 30, 1899, proposals were invited by public advertisement and opened March 27, 1900. The lowest bid received was 17½ cents per cubic yard for all but the 29-foot area, was deemed too high, and was rejected. Proposals were again invited, and opened June 30, 1900. The lowest bid received under the second advertisement was 16½ cents per cubic yard for dredging the 29-foot area and 13.85 cents per cubic yard for the remainder, by the Morris & Cumings Dredging Company, of New York. This bid has been accepted.

The total amount removed by George M. Valentine & Co. from the beginning of their contract until their collapse, on April 19, 1899, was 1,469,713 cubic yards, situ measurement, at 9.98 cents, and 1,833 cubic yards dredged in the 29-foot channel at 20 cents per cubic yard.

The total removed under the arrangement with Mr. A. R. Wright was 316,626 cubic yards, scow measurement, at 10½ cents per cubic yard, and 112,743 cubic yards, scow measurement, at 20 cents per cubic yard.

In removing the above quantities the following areas have been dredged to 30 feet at mean low tide: In front of Galt, Franklin, and Maine wharves an area about 450 feet wide and 650 feet long; widening main entrance 180 by 1,800 feet, making that channel about 680 feet wide; large area opposite Grand Trunk wharves, 1,100 feet wide by 2,100 feet long, and an additional area about 600 feet wide and 2,200 feet long in the upper part of the harbor.

The total amount expended on Portland Harbor, including Back Cove, up to June 30, 1900, is $903,209.64.

In round numbers, the estimated quantities to be dredged to complete the project include about 2,420,000 cubic yards, measured in situ, of general dredging, and 93,000 cubic yards from the area formerly dredged to 29 feet at mean low water, and the estimated cost thereof under the contract with Morris & Cumings Dredging Company is $350,515. Adding to the above the sum of $30,000 for engineering and contingencies, the total amount required to complete the project is $380,515, or in round numbers $380,000.

The harbor is defended by Forts Preble, Gorges, Scammel, Williams, Levett, and batteries on Great Diamond Island. There is a light-house on the breakwater, one on Spring Point Ledge, both in the harbor, and one at Portland Head, 3 miles distant from the city. The harbor is in the collection district of Portland and Falmouth, of which Portland is the port of entry.

Money statement.

July 1, 1899, balance unexpended	$422,659.76
June 30, 1900, amount expended during fiscal year	63,142.35
July 1, 1900, balance unexpended	359,517.41
July 1, 1900, outstanding liabilities	331.74
July 1, 1900, balance available	359,185.67
Amount (estimated) required for completion of existing project	21,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	21,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

July 4, 1836, for breakwater	$10,000.00
March 3, 1837, for breakwater	25,000.00
July 7, 1838, for breakwater	26,366.00
June 23, 1866, for extending breakwater, but unexpended balance made available for excavating middle ground by joint resolution of June 5, 1868	105,111.05
July 11, 1870, for improving harbor	10,000.00
March 3, 1871, for improving harbor	40,000.00
June 10, 1872, for improving Portland Harbor and Back Bay	45,000.00
March 3, 1873, for improving harbor	50,000.00
June 23, 1874, for improving harbor	20,000.00
March 3, 1875, for improving harbor	20,000.00
March 3, 1881, for improving harbor	20,000.00
August 2, 1882, for improving harbor	35,000.00
July 5, 1884, for improving harbor	30,000.00
August 5, 1886, for improving harbor	30,000.00
August 5, 1886, for Back Cove	26,250.00
August 11, 1888, for improving harbor	40,000.00
August 11, 1888, for Back Cove	25,000.00
September 19, 1890, for improving harbor	40,000.00
September 19, 1890, for Back Cove	25,000.00
July 13, 1892, for improving harbor	30,000.00
July 13, 1892, for Back Cove	20,000.00
August 18, 1894, for Back Cove	20,000.00
June 3, 1896	20,000,00
June 4, 1897	350,000.00
July 1, 1898	200,000.00
Total	1,262,727.05

Abstract of proposals for dredging Portland Harbor, Maine, March 27, 1900.

No.	Name and address of bidder.	2,412,456 cubic yards, situ (exclusive of 29-foot area).		93,045 cubic yards, situ (29-foot area).		Total.	Average monthly rate of progress.	Commence.
		Per cubic yards, situ.	Amount.	Per cubic yards, situ.	Amount.			
		Cents.		*Cents.*			*Cu. yds.*	1900.
1	Morris & Cumings Dredging Co., New York, N. Y.	20	$482,491.20	35	$32,565.75	$515,056.95	110,000	July 1
2	Eastern Dredging Co., Portland, Me	17½	422,179.80	28	26,052.60	448,232.40	100,000	May 1
3	The International Constructing Co., Syracuse, N. Y.	18	434,242.08	35	32,565.75	466,807.83	100,000	June 1
4	R. Moore Dredging Co., Mobile, Ala	18	434,242.08	20	18,609.00	452,851.08	80,000	(*a*)

[a] Sixty days after notification of approval of contract.

All bids rejected.

Abstract of proposals for dredging, June 30, 1900.

No.	Name and address of bidder.	2,412,456 cubic yards, situ (exclusive of 29-foot area).		93,045 cubic yards, situ (29-foot area).		Total.	Average monthly rate of progress.	Commence.
		Per cubic yard, situ.	Amount.	Per cubic yard, situ.	Amount.			
		Cents.		*Cents.*			*Cu. yds.*	1900.
1	J. Frank Plumb, Syracuse, N. Y.	17.4	$419,767.34	35	$32,565.75	$452,333.09	100,000	Aug. 15
2	G. H. Breymann & Bros., Toledo, Ohio	16.5	398,055.24	18.5	17,213.33	415,268.57	90,000	(*a*)
3	Rittenhouse Moore Dredging Co., Mobile, Ala.	16.7	402,880.15	16.7	15,538.51	418,418.66	100,000	Oct. 1
b 4	Morris & Cumings Dredging Co., New York, N. Y.	13.85	334,125.16	16.5	15,352.42	349,477.58	120,000	Sept. 15
5	Eastern Dredging Co., Portland, Me.	15.74	379,720.57	28	26,052.60	405,773.17	50,000	July 30

a Sixty days after receipt of contract. *b* Recommended for acceptance.

Contract in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Subject.	Price per cubic yard in place.	Date of approval.	Beginning of work.	Expiration.
		1897.		*Cents.*	1897.	1897.	1899.
1	Geo. M. Valentine & Co., New York, N. Y.	June 4	Dredging	*a* 9.98 *b* 20.00	June 22	June 1	Nov. 30

a Plan "B" and Back Cove. *b* For 29-foot area.

Contract expired by limitation November 30, 1899.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.		Tons.
1891	1,368,237	1892	1,376,815
1893	1,432,805	1894	1,214,887
1895	1,339,064	1896	1,357,575
1897	1,326,844	1898	1,334,752

1899:

Apples and fruit	32,914
Bacon, pork, lard, hams, and beef, etc	29,597
Brick	345
Brimstone	8,372
Cattle, sheep, and horses, on the hoof	2,701
Cement, lime, and pipe	22,921
Clay	37,490
Coal	669,045
Cotton	9,281
Fish—canned, pickled, smoked, and dry	35,066
General merchandise	220,213
Grain, flour, feed, and provisions	321,340
Leather and hides	3,000
Lumber and cooperage	61,475
Machinery and iron	7,113
Molasses and sugar	11,200
Oils and oilcloth	61,900
Paper stock, wood pulp, and rags	46,934

1899—Continued.	Tons.
Rope, sisal, and hemp	5,500
Sand	31,327
Salt	2,550
Total	1,620,284

Arrivals and departures in calendar year 1899.

Steamers:	
Foreign, 2,500 tons; draft, about 27 feet	296
Coastwise, 3,000 tons; average draft, 21 feet	17
Coastwise, 2,500 tons; draft, about 20 feet	208
Coastwise, 2,000 tons; average draft, 20 feet	7
Coastwise, 1,000 to 1,600 tons; draft, 18 feet	1,129
Coastwise, 400 tons average	72
Coastwise, from 45 to 140 tons	886
Coastwise, draft, 8½ feet	300
Coastwise, draft, 5 to 8 feet, 12 to 75 tons	213
Sailing vessels:	
Foreign, average 288 tons	319
Coastwise, 1,000 to 1,600 tons; draft, 18 feet	1,249
Coastwise, 100 to 650 tons; draft, from 9 to 12 feet	511
Coastwise, 40 to 75 tons; draft 6 to 8 feet	849
Barges, 1,000 tons; draft, 15 feet	138

A 14.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

The wreck of the schooner *Lavinia Bell*, a small wooden vessel, being an obstruction to the navigation of the Kennebec River, at Bath, Me., its removal was authorized May 27, 1899. After advertising for proposals, a contract was made August 12, 1899, with Andrews & Tibbetts, of Gorham, Me., for the removal of the wreck for the total price of $495. Work was commenced at once, and by the 25th of August the obstruction had been entirely removed. The total cost in connection with the removal of this wreck was $555.60.

The wreck of a small schooner or scow known as *Old Swan* being an obstruction to the navigation of Marsh River, Frankfort, Waldo County, Me., its removal was authorized January 30, 1900, and an allotment of $600 was made for the purpose. Proposals were invited by public advertisement, and on April 21, 1900, a contract was made with Harries & Letteney, of Boston, Mass., for the removal of the wreck for the total price of $240. By the 7th of June removal of the obstruction had been accomplished.

The wreck of the small schooner *Vicksburg* being an obstruction to navigation at Seal Harbor, Me., its removal was authorized February 2, 1900, and an allotment of $1,000 was made for the purpose. Proposals were invited by public advertisement, and on April 14, 1900, a contract was made with Charles W. Johnston, of Lewes, Del., for the removal of the wreck for the total price of $325. The work was done in May, 1900.

Abstract of proposals for removing wreck of schooner Lavinia Bell, July 31, 1899.

No.	Name and address of bidder.	Price.	Commence.	Complete.
1	Sylvester I. Hill, Chebeague, Me	$990	1899. Aug. 20	1899. Oct. 20
2	International Wreckage, Salvage and Submarine Co., Atlantic City, N. J	665	(*a*)	(*b*)
3	Charles W. Johnston, Lewes, Del	545	Aug. 10	Aug. 24
c 4	Andrews & Tibbetts, Gorham, Me	495	Aug. 15	Aug. 30

[a] In ten days from notification of award. [b] In fifteen days after commencement.
[c] Contract made with Andrews & Tibbetts.

Abstract of proposals for removal of wrecks of Old Swan and Vicksburg, March 26, 1900.

No.	Name and address of bidder.	Old Swan.	Vicksburg.
1	Harries & Letteney, Boston, Mass	$240	$585
2	Townsend & Booye, Atlantic City, N. J	745	700
3	Charles W. Johnston, Lewes, Del	690	325
4	Sylvester I. Hill, Chebeague, Me	360	560
5	Albert Pierce, Frankfort, Me	500	....
6	William S. White, Rockland, Me	385	435
7	H. Herbert Sturgis, South Standish, Me	485	565
8	Philip H. Doyen, Knightsville, Me	325	425

Contract made with Harries & Letteney for removing wreck *Old Swan.*
Contract made with Charles W. Johnston for removing wreck *Vicksburg*

Contracts in force during the fiscal year ending June 30, 1900.

No.	Contractor.	Date.	Vessel.	Price.	Date of approval.	Beginning of work.	Expiration.
a 1	Andrews & Tibbetts, Gorham, Me.	1899. Aug. 12	Lavinia Bell..	$496	1899. Aug. 26	1899. Aug. 15	1899. Aug. 30
a 2	Harries & Letteney, Boston, Mass.	1900. Apr. 21	Old Swan.....	240	1900. May 7	1900. May 19	1900. June 8
a 3	Charles W. Johnston, Lewes, Del.	Apr. 14	Vicksburg....	325	Apr. 28	May 10	May 16

[a] Contract completed.

A 15.

PRELIMINARY EXAMINATION OF PENOBSCOT RIVER, MAINE, AT AND NEAR BUCKSPORT NARROWS.

[Printed in House Doc. No. 61, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 2, 1899.

Sir: I have the honor to submit the accompanying copy of report dated August 3, 1899, by Maj. S. W. Roessler, Corps of Engineers, relative to preliminary examination of Penobscot River, Maine, at and near Bucksport Narrows, provided for by the river and harbor act of March 3, 1899.

Major Roessler reports in this connection that the channel depths in Bucksport Narrows are now very great, and that he is unable to construe the language of the act to mean any other point near the Narrows, unless it be Bucksport Harbor, an examination or survey of which is provided for in a separate item of said act.

In view of the statement of Major Roessler that the depth of water in Bucksport Narrows is very great, it is a reasonable presumption that the item requiring the examination of the locality was inserted in the act through error, and under the circumstances no further action in the premises is recommended.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF MAJ. S. W. ROESSLER, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 3, 1899.

GENERAL: Complying with that paragraph in the river and harbor act of March 3, 1899, which requires a preliminary examination of the "Penobscot River at and near Bucksport Narrows," I have the honor to report that an examination made by Mr. F. S. Burrowes, assistant engineer, has failed to definitely locate the point referred to in the language of the act.

It could not refer to Bucksport Narrows itself, because the depths there are very great. It might refer to Bucksport Harbor, an examination of which is required under a separate item in the same act. It might also refer, by a very liberal construction of the wording of the act, to a shoal above Indian Point, and about a mile above Bucksport, where some dredging was done in 1894, and where the channel is reported crooked, but having sufficient depth. It does not seem likely, however, that the latter point was the one intended by the language of the act, because such a point would have been much more naturally designated by reference to geographical points nearer to it than Bucksport Narrows, namely, Bucksport village or Indian Point.

After a careful consideration of the language of the act and of the fact that the only point "at and near Bucksport Narrows" requiring improvement is Bucksport Harbor, I am unable to construe the language of the act to apply to any other than the latter point, respecting which a separate examination has been made in compliance with the same act and a report thereon submitted.

The report of Mr. Burrowes is herewith.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 7, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

REPORT OF MR. F. S. BURROWES, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 2, 1899.

MAJOR: In reference to the examination of "Penobscot River at and near Bucksport Narrows," as called for by the act of March 3, 1899, I have the honor to report that, from inquiries made at Bucksport and Bangor and from examinations of the maps in this office, I find that the head of the narrows is about one-half mile below Bucksport and the depths vary from 60 to 100 feet, so that there is evidently no necessity for improvement at Bucksport Narrows.

The nearest point to Bucksport Narrows requiring improvement is Bucksport Harbor, an examination of which is required under a separate item in the act of March 3, 1899. This examination has been made and report thereon submitted for your consideration.

Above Indian Point, about a mile above Bucksport Narrows, there is a place where a shifting bar at times obstructs the channel, which by a very liberal construction of the wording of the act might be regarded as the locality referred to as *near* Bucksport Narrows and needing examination.

Some dredging was done at this point in 1894, when the material (sawdust and mud) was found to fill in almost as fast as it was removed. Surveys made before and since have shown that while the channel shifts from time to time a good depth (nearly 22 feet at mean low tide) has generally been maintained.

Mr. Walter Ross (of the firm of Ross & Howells, of Bangor, who do the greater part of the towing in the Penobscott River and are therefore generally well informed as to the condition of the channel) stated to me on July 29 that there was a sufficient depth of water at Indian Point, but that the channel was crooked, the crossing from the westerly to the easterly side being almost at right angles to the the general direction of the river.

Very respectfully, your obedient servant,

F. S. BURROWES,
Assistant Engineer.

Maj. S. W ROESSLER,
Corps of Engineers, U. S. A.

A 16.

EXAMINATION AND SURVEY OF BUCKSPORT HARBOR, MAINE.

[Printed in House Doc. No. 275, Fifty-sixth Congress, first session,]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, January 9, 1900.

SIR: I have the honor to submit herewith copies of reports dated August 2 and December 16, 1899, with maps,[1] by Maj. S. W. Roessler, Corps of Engineers, upon preliminary examination and survey, respectively, of Bucksport Harbor, Maine, made in pursuance of requirements of the river and harbor act of March 3, 1899.

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[1] Not reprinted. Printed in House Doc. No. 275, Fifty-sixth Congress, first session.

The obstruction to navigation of the Penobscot River at this point is a sawdust bar in front of a portion of the wharf front of the town of Bucksport, and two projects for improvement are presented by Major Roessler for dredging the area indicated on the accompanying map to a depth of 14 feet at an estimated cost of $12,500, or to a depth of 16 feet at a cost of $20,000, the latter project being preferred by him.

The locality is considered by Major Roessler to be worthy of improvement by the United States, and he states that the work can be done advantageously only as one contract and under a single appropriation. The views of the local officer are concurred in by the division engineer, Col. G. L. Gillespie, Corps of Engineers.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF BUCKSPORT HARBOR, MAINE.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 2, 1899.

GENERAL: I have the honor to submit the following report of a preliminary examination of Bucksport Harbor, required by the river and harbor act of March 3, 1899.

Bucksport is located on the left bank of Penobscot River, about 20 miles below Bangor and directly opposite Fort Knox, on the right bank. The river at this point divides into two branches around Whitmores Island. The main channel is down the right branch, and the rush of water into it at the head of the island maintains deep water along the shore of Fort Knox, opposite Bucksport Harbor. The area directly in front of the line of wharves at Bucksport is outside of the influence of the main current of the river, but under the influence of the more sluggish current of the left branch, whose velocity is not sufficient to hold in suspension the material brought down by the main river. As a result, a shoal has formed, known as the "middle ground," which is the subject of this investigation. This shoal was carefully surveyed in 1875, and, under a project based thereon, was dredged between 1875 and 1877 to a depth of 12 feet at mean low water over a greater portion of the area and to a depth of 8 feet over a portion of the remainder, funds not being sufficient to complete the improvement as projected. From the best information obtainable it appears that the bar has again shoaled to such an extent by new deposits as to be practically in the same condition as it was before the improvement of 1875 and 1877. The material dredged here was found to be almost all soft mud. The new deposit is probably sawdust and mud and easy to excavate.

Besides the general commerce incidental to a village the size of Bucksport, a large fishing industry is carried on here, many vessels being fitted out for the Grand Banks and returning with their catch. The draft and size of these vessels are limited by the available depth of the harbor. Those now fitted out draw from 15 to 16 feet.

The place is, in my opinion, worthy of improvement by the General Government, and a survey is recommended in order to ascertain the probable cost. Such a survey can be made for $400.

The examination on the ground was made by Mr. F. S. Burrowes, assistant engineer, whose report is herewith.

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, August 5, 1899.

Respectfully forwarded to the Chief of Engineers, recommended for approval.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Bucksport Harbor, Maine. The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

John C. Scofield,
Chief Clerk.

REPORT OF MR. F. S. BURROWES, ASSISTANT ENGINEER.

United States Engineer Office,
Portland, Me., August 1, 1899.

Major: In obedience to your instructions I have the honor to submit the following report of a preliminary examination of Bucksport Harbor, made in accordance with the requirements of the river and harbor act of March 3, 1899.

Bucksport is situated on the left bank of the Penobscot River, in the concave side of a sharp bend and at the head of Whitmores Island. The main channel of the river opposite the town is from 12 to 14 fathoms deep, but on the Bucksport side a bar forms with about 6 feet of water on its crest at mean low tide, with slightly deeper water immediately along the wharves. The formation of this bar is probably the result of the division of the current, the swiftest part passing down the main river and a more sluggish current down the eastern channel (locally known as "The Thoroughfare") at Whitmores Island, having between these channels a triangular area of comparatively dead water, which forms a settling basin for sawdust, mud, etc., brought down the river.

In 1875 a detailed survey was made of this harbor and bar, and dredging in accordance therewith was begun October 21, 1875, and completed November 2, 1877. The work accomplished consisted in obtaining a depth of 12 feet at mean low tide over about two-thirds of the area of the bar (at its upper part and over to the general lines of the wharves) and a depth of 8 feet over about one-half of the balance of the bar. That a depth of 12 feet was not made over the whole bar was apparently due to a lack of necessary funds. From the best evidence at hand the bar seems to be in about the condition it was before the dredging in 1875 to 1877, and this is assumed in the estimates submitted herewith.

A large fishing business (probably the largest in Maine) is carried on at Bucksport, many vessels being fitted out for the Grand Banks and returning here with their catch. This business has assumed such proportions that one concern finds it economical to bring their salt direct from European ports by the cargo, as many as six cargoes, valued at $5,000 each, being received annually. The draft and size of these vessels are limited by the available depth in the harbor. The receipt of coal for use in Bucksport and for distribution in the vicinity would be increased by securing a greater depth of water at the wharves. Although the wharf where the Boston and Bangor steamboats land is in deep water, yet in strong westerly winds these boats occasionally ground on the upper end of the bar.

The vessels that now fit out for bank fishing draw from 15 to 16 feet, and as they are all sailing vessels they must wait until both wind and tide are favorable before starting out, and even then they must be warped to the head of the bar before they can fill away into deep water.

From the conditions as given, it would seem that Bucksport Harbor is worthy of improvement by dredging the bar and channel immediately in front of the wharves. To dredge the whole bar to a depth of 12 feet at mean low tide and a channel along the wharves to a depth of 16 feet and 200 feet wide would require the removal of 150,000 cubic yards, measured in scows, at 16 cents, $24,000. This would allow many of the smaller vessels to leave the wharves directly at any stage of tide, and most of the larger ones would leave under the same conditions by warping to the head of the bar. To dredge both bar and channel to 16 feet, so that all fishing vessels could fill away from the wharves at any stage of tide, would require the removal of about 240,000 cubic yards, measured in scows, at 16 cents, $38,400.

The character of the material, as determined during the survey of 1875 and by the dredging, was found to be almost all soft mud. The material that has filled in since the last dredging is probably sawdust and mud. The prices given in the estimates are regarded as ample to cover the cost of dredging and all contingencies of engineering, etc.

The above estimates are, of course, only roughly approximate, and it would require a careful survey to determine the conditions accurately. The cost of such a survey and the necessary map would probably be about $400.

I visited Bucksport July 29, and talked with Mr. O. F. Fellows, deputy collector of customs; Mr. Leslie C. Homer; Capt. T. M. Nicholson, the local agent of the Boston and Bangor Steamboat Line, and others interested in the improvement of Bucksport Harbor, and from them I obtained much valuable information.

The improvement depth for the main channel of the Penobscot River in the vicinity of Bucksport is 22 feet at mean low tide. This was fixed from the fact that deep-draft tows start up the river at about half flood tide in order to reach Bangor on the crest of the flood, where the mean low-tide depth is about 14 feet, the extreme low-tide depth being 11 feet. It will thus be seen that this depth of 22 feet at mean low tide would not be a factor in determining the depth to be obtained in Bucksport Harbor, as the element of time in getting from the wharfs to deep water need not be considered.

The mean range of tides at Bucksport is 10.3 feet.

Very respectfully,

F. S. Burrowes,
Assistant Engineer.

Maj. S. W. Roessler,
Corps of Engineers, U. S. A.

SURVEY OF BUCKSPORT HARBOR, MAINE.

United States Engineer Office,
Portland, Me., December 16, 1899.

General: I have the honor to submit the following project for the improvement of Bucksport Harbor, Maine:

The report of the preliminary examination authorized by the river and harbor act of March 3, 1899, was submitted under date of August 2, 1899. In this report the opinion was expressed that the place was worthy of improvement by the General Government, and in a letter of August 25, 1899, the Chief of Engineers directed a detailed survey to be made and a project submitted. The survey was made in November. The results are given on sheet 1, herewith transmitted, to which is attached sheet 2, showing the improvements heretofore made in the same locality.

The obstruction to navigation is a sawdust bar in front of a portion of the wharf front of the town of Bucksport. This bar has been produced partly under the influence of an eddy which is set up by the strong ebb current down the west branch at certain stages of the tide, and partly by a sluggish current which at other stages of the tide passes down by the east channel. In 1875 this shoal was reported as a serious obstruction to navigation, with but 4 feet of water at mean low tide, and under appropriations of that year was dredged to a depth of 12 feet at mean low tide immediately in front of the wharfs and farther back to a depth of 8 feet at mean low tide. The extent of the dredging done in 1875 is indicated upon sheet 2.

A comparison of the present survey with that of 1875, before the improvement of that year was commenced, shows that the area then dredged at the upper end of the harbor has been maintained, while that over the lower portion has received some new deposits, as was to be anticipated. These deposits, however, have not been so extensive as might reasonably have been expected from the influences existing at this locality, and the improvement then made may therefore be regarded, on the whole, as a success. This result is contrary to the generally expressed notions of some of the practical river men on the Penobscot, who maintain that the dredging of sawdust bars can produce no lasting results, contending that the material so removed is almost immediately replaced by new deposits from the large amount of sawdust which is constantly moving in a state of semisuspension up and down the river under the influence of the tides. The favorable situation noticed in this respect is doubtless due, in a large measure, to laws of Congress against the deposit of mill waste in the beds of navigable streams, the effect of which has been to greatly lessen the quantity of material carried in suspension in recent years.

Two projects are submitted—one for dredging the area indicated upon the map to a depth of 14 feet at mean low water and the other to a depth of 16 feet at mean low water. The first project will require the removal of about 91,000 cubic yards, scow measurement, of sawdust and mud, and will cost, at 12½ cents per cubic yard, with $1,125 added for contingencies, the sum of $12,500. The other project will require the removal of about 152,500 cubic yards, scow measurement, and will cost, at 12 cents per cubic yard, with $1,700 added for contingencies, the sum of $20,000. The larger project is preferred and is recommended.

The depth has been fixed to meet the requirements of the bank fishermen which are fitted out from this point, the largest of which draw about 16 feet. During the past year it has been stated that five Italian barks of about 1,000 tons capacity each, laden with salt, have entered this port, drawing about 20 feet. Coal schooners generally draw about 15 feet.

The commercial statistics for this port, as furnished by the deputy collector, are as follows:

	Tons.
Colonel Page, lumber	5,000
Nichols Wharf, coal, wood, grain, etc	10,000
Nicholson & Hill:	
Salt	3,000
Coal	2,000
Fish	2,500
Sundry merchandise	5,000
A. C. Swazey, coal	1,500
Central wharf property	25,000
Granite	50,000
Boston and Bangor Steamboat Company	200,000
Total	304,000

The work can be done advantageously only as one contract and under a single appropriation. * * *

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, December 19, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

A 17.

PRELIMINARY EXAMINATION OF MOUTH OF KENDUSKEAG RIVER, MAINE, WITH A VIEW TO SECURING A CHANNEL 2 FEET DEEP AT EXTREME LOW TIDE FOR THE ENTIRE WIDTH OF THE RIVER.

[Printed in House Doc. No. 54, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 2, 1899.

Sir: I have the honor to submit herewith a copy of report dated May 6, 1899, by Maj. S. W. Roessler, Corps of Engineers, of the results of a preliminary examination of Kenduskeag River, Maine, at its mouth, with a view to securing a channel 2 feet deep at extreme low tide for the entire width of the river.

This river is under improvement by the United States, and it is believed that the project now in course of execution will, when completed, satisfy the present needs of the navigation interests, and Major Roessler therefore reports that, in his opinion, the improvement of the stream to the extent indicated in the above-mentioned item of the river and harbor act approved March 3, 1899, in accordance with which the present examination was made, is not a work worthy of being done by the United States at the present time. His views are concurred in by Col. G. L. Gillespie, Corps of Engineers, Division Engineer, and by me.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. S. W. ROESSLER, CORPS OF ENGINEERS.

United States Engineer Office,
Portland, Me., May 6, 1899.

General: Complying with letter of March 10, 1899, from the Chief of Engineers, United States Army, I have the honor to submit the following report of the preliminary examination authorized by the following paragraph in the river and harbor act of March 3, 1899:

> Kenduskeag River at its mouth, with a view to securing a channel 2 feet deep at extreme low tide for the entire width of the river.

The Kenduskeag is a tributary of the Penobscot River and traverses the heart of the commercial district of the city of Bangor, Me. Navigation is carried on from the mouth of the river to the post-office bridge, a distance of about 1,400 feet. Near its mouth the stream is crossed by a railroad drawbridge with two draws, 34 feet and 35 feet in width, respectively. Between the two bridges the river forms a basin in which the great bulk of the traffic in the stream is carried on. The width of the basin at the upstream end is about 250 feet, and 350 feet at the downstream end. Both sides are lined with wharves supporting warehouses, the wharves consisting of crib work resting upon the natural bottom of the stream.

The average level of the bottom is about that of average low tide. The average range of the tide is about 13½ feet, and 12 feet is guaranteed vessels desiring to enter this stream. The bottom of the basin is uneven, being higher in the middle than at the wharves, forming a middle ground on which deep vessels are likely to ground in maneuvering. The middle ground is exposed at average low tide, and all floating driftwood and bowlders brought down by ice at low water are forced near the wharves, where they frequently lodge, making the berths uneven. As all vessels ground at low tide, this accumulation of rigid material where they lie is a source of danger and annoyance, necessitating more or less expense to wharf owners in keeping their berths clear. The material of the bottom of the stream is believed to be a rather hard mixture of mud, sand, and gravel, in which are embedded bowlders of all sizes up to a ton or more in weight.

In 1897 this stream was surveyed and a project submitted for its improvement, which is published in House Doc. No. 49, Fifty-fifth Congress, first session. The plan of improvement proposed was to dredge a channel 90 feet wide and 2 feet deep at extreme low water up the middle of the basin and to carry the same depth through both draws of the bridge and to deep water in the Penobscot. Accepting this project, Congress appropriated, by the river and harbor act of March 3, 1899, the sum of $10,680.45 to complete the improvement.

Before submitting the detailed project for expending this sum I visited Bangor to ascertain more particulars of the present navigation of the stream than could be learned from data in this office. From interviews with a number of the largest shippers I ascertained that what was most desired was a leveling and, if practicable, a deepening of about 2 feet of the ships' berths along the wharves, and a removal of the middle ground to a depth slightly below that at the wharves, so as to divert water and drift at low tide away from the wharves to the center of the stream and to facilitate maneuvering of vessels. Further inquiry elicited the fact, admitted by all whom I questioned, that any dredging along the wharves would tend to impair the stability of their outer ends and tend to produce settling, for which the United States might become liable. They then suggested that if the berths were leveled off at their present depth and the middle of the stream deepened 1 or 2 feet below the level of the berths the present needs of commerce would be satisfied and all the improvement made that could in justice be asked for the present navigation of this stream.

The situation as above outlined seemed to require a slight modification of the details of the project of May 3, 1897, to the extent of widening the channel in the basin to within 30 feet of the line of wharves and reducing the depth correspondingly. A project was accordingly submitted on April 18, 1899, to provide for these changes, with the statement that if executed as proposed the work that can probably be done under the appropriation already made would satisfy the present needs of the commerce on this stream.

In view of the above facts, I am of the opinion that the improvement of this stream to the extent indicated in the above quotation from the river and harbor act of March 3, 1899, is not a work worthy of being done by the United States at the present time.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, May 13, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer. * * *

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

A 18.

EXAMINATION AND SURVEY OF CAMDEN HARBOR, MAINE.

[Printed in House Doc. No. 263, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 6, 1900.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of Camden Harbor, Maine, and I now have the honor to submit the accompanying copy of report of examination, dated June 15, 1899, and copy of report of survey, dated December 23, 1899, with map,[1] both made by the local engineer officer, Maj. S. W. Roessler, Corps of Engineers.

Two projects for the improvement of Camden Harbor have been heretofore adopted and practically completed, under the first a channel depth of 7 feet at mean low water having been secured, and under the second a depth of 10 feet at mean low water, besides dredging toward the head of navigation to a depth of 5 feet and in front of the Boston and Bangor Steamship Company's wharf in the outer harbor to a depth of 12 feet. An increase in the harbor depth is now desired by the parties interested in steamboat navigation at Camden.

As a result of his survey Major Roessler recommends the dredging to a depth of 14 feet at mean low water, or 11.7 feet at extreme low water, of the area (marked A on the accompanying map) in front of the Boston and Bangor Steamship Company's wharf, at an estimated cost of $7,400, but in his opinion the inner harbor is not worthy of any further improvement at the present time. The views of the local officer are concurred in by the Division Engineer, Col. G. L. Gillespie, Corps of Engineers.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF CAMDEN HARBOR, MAINE.

United States Engineer Office,
Portland, Me., June 15, 1899.

General: The river and harbor act of March 3, 1899, provides for the preliminary examination of Camden Harbor, Maine. Complying therewith, I have the honor to submit the following: * * *

Before improvement the harbor was obstructed by shoal water over nearly all of its area, there being less than 12 feet depth over most of it. Improvements have been made under two projects. Under the first project appropriations aggregating $30,000 were expended between 1873 and 1875 in excavating a channel 100 feet wide, 7 feet deep at mean low water, and 1,500 feet long on the east side of the harbor, and one of like width and depth and 1,400 feet long on the west side.

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[1] Not reprinted. Printed in House Doc. No. 263, Fifty-sixth Congress, first session.

The second project contemplated dredging an area in front of the Boston steamboat wharf to 12 feet at mean low tide; the dredging of a wide channel of entrance and of channels on the east and west side of the harbor to 10 feet at low water; the dredging of extensions of the latter channels to the head of the harbor to 5 feet at low tide, and after the completion of the channels the removal of the middle ground to the same depth as the adjacent channels. Under this project $45,000 was appropriated between the years 1888 and 1896, and all the work contemplated was accomplished, with the exception of a small area at the extreme upper end of the harbor, with reference to which Colonel Damrell stated that "the material is very hard and will be expensive to remove. I see no object in carrying the improvement any farther, and do not think any further expenditure would be justified. I have, therefore, to recommend that the project be regarded as completed."

The citizens of Camden interested in navigation of the harbor are not greatly interested in the completion of this work, and I concur with Colonel Damrell in the opinion that no further expenditure in that portion of the harbor is either judicious or necessary. On the occasion of a visit to Camden last winter, for the purpose of collecting the information called for by the Chief of Engineers, under date of December 14, 1898, I ascertained that the main motive of the citizens in asking for more work in their harbor was to obtain a further deepening to 12 feet of the area heretofore dredged to 10 feet, which deepening, they state, would effect considerable reduction in freight rates on bulk freight by admitting vessels of deeper draft, and would dispense, in a large measure, with lighterage, which method of discharging is still resorted to to some extent, at a considerable cost to vessels that can not safely enter the harbor at medium or low water. Having no railway other than a trolley line 8 miles long, running between Camden and Rockland, Me., the citizens are vitally interested in water navigation and in securing the largest measure of improvement that the trade of that port will justify.

The receipts and shipments during the year 1898, as given to me by the citizens, were approximately 51,000 tons, the largest items being coal, 16,350 tons; iron, 9,500 tons; lumber, 8,700 tons; and lime, 6,250 tons. A detailed statement of the commerce of this harbor is hereto appended. If the harbor is deepened to the extent desired by the citizens, they estimate that there would be an annual saving of about $8,600 on incoming freight and about $19,800 on outgoing freight. I have no means of verifying these figures, which seem to me very large.

I am of the opinion that the further improvement of this harbor is worthy of consideration, but I am unable to say at the present time whether it is a work worthy to be undertaken by the United States, because I have no knowledge of the character of material to be removed and can not, therefore, estimate the cost of the desired improvement. This question can not be well decided without a survey especially made to ascertain the character of the material to be excavated. Such a survey is recommended, and will cost $400.

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, June 21, 1899.

Respectfully forwarded to the Chief of Engineers, recommending a survey of the locality at the estimated cost of $400.

* * * * * * *

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Camden Harbor, Maine.

It is reported that the improvement of this locality is worthy of consideration, and I recommend that a survey be made, after which a more reliable opinion can be formed as to the scope of improvement justified by the commerce involved.

A. MACKENZIE,
Acting Chief of Engineers.

[Third indorsement.]

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

Statistics of commerce for the harbor of Camden, Me., including receipts and shipments for the year beginning January 1, 1898, and ending December 31, 1898.

	Tons received.	Tons shipped.		Tons received.	Tons shipped.
Oakum stock	400	250	Lime		6,250
Brick	820		Fish and oysters	135	25
Coal	16,350		Stone	1,500	
Cotton cloths	*a* 110	110	Wood	1,650	
Farm products		20	Wool	*a* 800	630
Grain and feed	2,740		Miscellaneous, including salt	867	
Hay		100			
Iron	5,700	3,800	Total	39,772	11,185
Lumber	8,700				

a Manufactured.

Number of sailing vessels arrived and departed	2,764
Number of steamers arrived and departed	2,140

Provided harbor were dredged so deep-draft vessels and steamers could come into harbor and unload at wharves—

Amount to be saved on incoming freight	$8,652
Amount to be saved on outgoing freight	19,820
Total	28,472

SURVEY OF CAMDEN HARBOR, MAINE.

UNITED STATES ENGINEER OFFICE,
Portland, Me., December 23, 1899.

GENERAL: I have the honor to submit the following results of a survey of Camden Harbor, Maine, made under the provisions of the river and harbor act of March 3, 1899, with a view to its further improvement in the interest of navigation.

A tracing of this survey and a copy of the report of Mr. A. C. Both, assistant engineer, are herewith.

The port of Camden consists of the outer harbor, which forms the main anchorage ground, and the inner harbor, upon which all but one of the wharves are located. Before improvement the inner harbor was obstructed by shoal water, so that only small vessels drawing about 5 feet could reach the wharves at low stages of the tide. Under improvements made in 1876 and 1896 the inner harbor has been dredged to a depth of 10 feet at mean low water and the area in front of the steamboat wharf in the outer harbor to a depth of 12 feet at mean low water. These depths have been fairly well maintained.

The desire for deeper water is based upon two reasons: First, the needs of the Boston and Bangor Steamship Company, and, second, the alleged requirements of a steamer service, not now in operation, between New York City and Bangor and other points on Penobscot River and Bay.

The boats of the Boston and Bangor line are fine steamers, have admirable passenger as well as large freight accommodations, and are of vital importance to the commercial life of the city of Camden and the surrounding community. These steamers draw about 10 feet when loaded, and as they run on schedule time they require sufficient water at the lowest stage in order to reach their wharf at all times. Extreme low water at this point, according to the United States Coast Survey record, is 2.3 feet below mean low water. As the portion of the harbor dredged for the convenience of these boats was deepened to only 12 feet at mean low water, there is only 9.7 feet at extreme low tide, which is less than the draft of the boats. The complaint that there is not sufficient water here would therefore appear well founded, and it is further complained that the area dredged heretofore is not large enough to permit the boats to maneuver properly in coming to and leaving the wharf.

The needs of this line of boats would be satisfied by dredging area A on the accompanying tracing to a depth of 14 feet at mean low water, or 11.7 feet at extreme low water. The material to be removed is believed to be mud, sand, and gravel, and the quantity about 33,300 cubic yards. The cost of the improvement, therefore, estimated at 20 cents per cubic yard, and allowing $740 for contingencies, would be $7,400. This work is recommended.

The request for a deepening of the harbor farther up and into the cove upon which most of the wharves are located is based exclusively, as above stated, upon the needs of a steamboat service, not now in operation, between New York and Bangor and intermediate points. This service, I am informed, was started in 1887 and continued until 1892, but that during the whole period was never placed nor maintained upon a sound footing. The service was resumed by one small boat in 1898, and was in operation only a short time when the steamer was lost in the terrific gale of November 25, 1898. The service has not been resumed since. In short, there is no steamboat line at the present time, nor any in prospect, upon which any plans could be based for a further improvement of the inner harbor. This being the case, and the depth already provided being amply sufficient for the accommodation of the sailing vessels doing business at this port, I have the honor to report the inner harbor as unworthy of any further improvement at the present time. No estimate is therefore submitted.

* * * * * * *

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, December 26, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

REPORT OF MR. A. C. BOTH, ASSISTANT ENGINEER.

United States Engineer Office,
Portland, Me., December 22, 1899.

Major: I have the honor to submit the following report upon a survey of Camden Harbor, Maine, made under your direction in compliance with a requirement in the river and harbor act of March 3, 1899:

A plan of this survey, made to a scale of 1:1,000, is also herewith submitted.

The survey was commenced November 17 and completed November 23, 1899. The wharf and shore lines were taken from a survey made in 1887. Changes of wharf lines (by reason of extensions, repairs, or new structures), which have been made since that time, were determined, and are shown on the accompanying map.

All soundings were located from triangulation stations and are referred to mean low water, the plane of reference. A number of tests were made near the limits of the former 10-foot improvement. Their locations are shown and the results given in tabular form on the map.

Before improvements of Camden Harbor were commenced small vessels only, drawing about 5 feet, could reach the wharves at low water.

Under the first improvement, completed in 1876, channels 7 feet deep and 100 feet wide were dredged in front of the wharves on the east and west side of the harbor.

Under the second improvement, completed in 1896, an area in front of the Boston and Bangor steamboat wharf was dredged to a depth of 12 feet at mean low water. The common entrance to, and the channels on the east and west sides, also the middle ground between these channels, were dredged to a depth of 10 feet at mean low water. Small channels at the upper end of the harbor were partly dredged to a depth of 5 feet at mean low water, owing to the extreme hardness of the material.

The soundings recently taken indicate that very little shoaling, if any, has taken place except close to the limits of the dredging, where the banks have slightly washed down. In general it may safely be concluded that the improvements so far made are permanent.

I called upon the parties most interested in navigation and requested them to state their views regarding further improvements desired. Nearly all these parties considered the present depth of 10 feet sufficient for their wants. The agent of the Boston and Bangor steamers said that their steamers at very low tides had difficulties in landing at or departing from their wharf, and that an additional depth of a few feet would be necessary to allow the steamers free access to the wharf at all times. These steamers during the summer season run daily in both directions, and during the winter two round trips per week are made. They carry passengers and a large percentage of all the freight received and shipped, and it is believed that dredging to a depth of 14 feet in front of the wharf will insure free and safe navigation for the future. No shoaling of this area has been noticed since it has been dredged under the second improvement.

For a number of years a line of steamers has been plying between Bangor, Me., and New York, touching at Camden. The last steamer employed was the *Pentagoet*, which was lost with all on board during the November gale of 1898. Since then no steamer has again been put on this route, but the Manhattan Steamship Company, of New York, is now considering the purchase of a wharf at the west side of the harbor, so as to avoid anchoring in the outer harbor and there discharging upon or receiving freight from lighters, as has been necessary heretofore. In order to provide a sufficient depth of water so that steamers of this line may be able to reach the wharfs, it seems to be generally desired to have a part of the area of the inner harbor (formerly dredged to 10 feet) deepened to 12 feet at mean low water. Although the cost of such an improvement is not large compared with the facilities and the saving of time and money which would follow, it is not at this time considered prudent to provide the necessary accommodations for such a steamer when neither the draft of the vessel nor the place of landing for same is definitely known.

As a matter of reference, an approximate estimate of cost of dredging to 12 feet at mean low water such a part of the former 10-foot area as would probably be required for the accommodation of the New York and Bangor steamer is herewith submitted.

Dredging the area (formerly dredged to 10 feet) from deep water at the entrance to a point off the lower corner of Adams Wharf, to a depth of 12 feet at mean low water, will require the removal of about 45,000 cubic yards, measured in scows, of stiff mud, which, at a cost of 15 cents per cubic yard, would amount to	$6,750
Add for engineering expenses and contingencies	750
Total cost of improvement	7,500

The dredging of a sufficiently large area in front of the Boston and Bangor steamer wharf to allow these steamers to land and depart at all stages of the tide is herewith recommended, and a depth of 14 feet at mean low water (or two feet more than there is now) is believed to be ample.

Estimated cost of improvement.

Dredging area marked A on accompanying plan, in front of Boston and Bangor steamer wharf to a depth of 14 feet at mean low water, will require the removal of 33,300 cubic yards, measured in scows, of soft mud, sand, and gravel, at 20 cents per cubic yard	$6,660
Add for engineering expenses and contingencies	740
Total cost of improvement	7,400

The following commercial statistics were collected by personally interviewing many parties:

Articles.	Tons received.	Tons shipped.	Articles.	Tons received.	Tons shipped.
Brick	435		Oak	1,350	
Coal	12,500		Salt	1,530	
Corn	2,100		Lime		4,000
Oats	480		Fish of all kinds	235	100
Flour	225		Wool	780	500
Feed	500		Wood (cord)	7,500	
General merchandise	5,100	3,000			
Iron	12,200	1,100	Total	204,935	8,700
Lumber (pine, spruce, southern pine)	160,000				

The large tonnage of lumber and timber received is accounted for by the recent increase in shipbuilding. During the survey, two 5-masted schooners of 1,800 tons register were under construction. One of these has since been launched, and the keel of a 6-masted schooner (the first ever to be built) is about to be laid.

Very respectfully, your obedient servant,

A. C. Both,
Assistant Engineer.

Maj. S. W. Roessler,
Corps of Engineers, U. S. A.

A 19.

EXAMINATION AND SURVEY OF BOOTHBAY HARBOR, MAINE.

[Printed in House Doc. No. 277, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 8, 1900.

Sir: I have the honor to submit herewith copy of report of preliminary examination, dated August 18, 1899, and copy of report of December 20, 1899, with map,[1] giving the results of survey of Boothbay Harbor, Maine, made by Maj. S. W. Roessler, Corps of Engineers, to comply with the terms of the river and harbor act approved March 3, 1899.

At the time the preliminary examination was made it was believed that this locality was worthy of improvement on account of the commercial interests involved, but from the facts developed during the survey the local officer draws the conclusion that Boothbay Harbor is so well favored by natural advantages as to require no artificial works of improvement at the present time in the interests of navigation, and therefore no project is submitted. The views of Major Roessler are concurred in by Col. G. L. Gillespie, Corps of Engineers, the Division Engineer.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen. Chief of Engineers,
U. S. Army

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF BOOTHBAY HARBOR, MAINE.

United States Engineer Office,
Portland, Me., August 18, 1899.

General: Complying with letter of March 10, 1899, from the Chief of Engineers, I have the honor to submit the following report of a preliminary examination of Boothbay Harbor, Maine, authorized by the river and harbor act of March 3, 1899.

A similar examination was made by Lieut. Col. A. N. Damrell, Corps of Engineers, in 1897, and his report thereon was published as House Doc. No. 46, Fifty-fifth Congress, first session.[2]

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[1] Not reprinted. Printed in House Doc. No. 277, Fifty-sixth Congress, first session.

[2] Reprinted in Annual Report of Chief of Engineers for 1897, page 802.

Colonel Damrell deemed the locality worthy of improvement and recommended a survey, but the latter was not made because the language of the act stipulated that after the formal report of an examination no additional report for the same fiscal year should be made unless ordered by a concurrent resolution of Congress.

A full description of the locality is contained in the above document and in the accompanying report of Mr. A. C. Both, Assistant Engineer, and need not be repeated here.

I concur with Colonel Damrell in the opinion that the place is worthy of improvement by the General Government, and recommend a survey be made to ascertain the probable cost. Such a survey will cost about $600.

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, August 21, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer respecting this locality and recommending that a survey be made at an estimated cost of $600.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

Office Chief of Engineers,
U. S. Army,
August 23, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Boothbay Harbor, Maine.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

War Department,
August 24, 1899.

Approved.

Elihu Root,
Secretary of War.

REPORT OF MR. A. C. BOTH, ASSISTANT ENGINEER.

United States Engineer Office,
Portland, Me., August 8, 1899.

Major: In compliance with instructions contained in your letter of July 15, 1899, to make a preliminary examination of Boothbay Harbor, provided for in the river and harbor act of March 3, 1899, I proceeded to that place on July 20, 1899, and have the honor to submit the following report:

The town of Boothbay Harbor is located about 12 miles south of Wiscasset, in the county of Lincoln, Me., and about 2 miles north-northeast from Burnt Island Light-House. Boothbay Harbor belongs to the customs district of Wiscasset, the port of entry, and has a deputy collector of customs.

The population of the town is about 2,000. Boothbay Harbor is the center of trade for North and East Boothbay, Southport, Edgecomb, and Bristol. It has the following manufacturing establishments:

(1) Cumberland Bone and Phosphate Company receive 7,000 tons and ship 6,000 tons annually.

(2) Poole's Sardine Factory, capacity 3½ tons of packed sardines daily during packing season.

(3) Maddock's Sardine Factory, capacity 20 tons of packed sardines daily during packing season.

(4) Pickard's Sardine Factory, capacity 15 tons of packed sardines daily during packing season.

(5) Greenlaw's Sardine Factory, capacity 2½ tons of packed sardines daily during packing season.

(6) Pierce's Sardine Factory, capacity 5 tons of packed sardines daily during packing season.

(7) Barter & Sweet's Sardine Factory, capacity 2½ tons of packed sardines daily during packing season.

(8) Poole's Cold Storage, for fish and bait, capacity about 3,500 barrels, or 440 tons.

(9) Nickerson, wholesale salt and fish, sailmakers and seines; doing a business of about $240,000 per annum. This concern imports about 2,250 tons of salt per year, handles about 750 tons of salt codfish, about 500 tons of alewives, and up to 500 tons of herring.

This concern and several others were located on the east side of the harbor, isolated from the town, at considerable inconvenience, for the reason that the depth of water at the wharves in Boothbay Harbor is not sufficient for their requirements.

The quantity of merchandise and general supplies which is brought here by the different lines of steamers is estimated by the deputy collector of the port as 225 tons per week, or 11,700 tons per annum. From the same source I learn that about 40,000 tons of ice are shipped annually.

There are also two marine railways adapted for vessels up to 500 tons.

Boothbay Harbor is well protected from all sides and has abundant depth of water for the largest vessels. The approach from the sea is short, wide, and safe, and is well marked by Burnt Island and Ram Island lights, and is much used as a harbor of refuge.

It is stated that from 15,000 to 18,000 vessels pass Burnt Island Light annually.

The anchorage covers an area of about 1 mile by one-half mile, excluding the upper harbor in front of the wharves of the town.

Boothbay Harbor is about 12 miles from the nearest railroad station, and depends mostly upon water communication, which is as follows:

(1) To Boston, Mass., triweekly, steamer *Lincoln*, 966 tons; draws 11½ feet.

(2) To Portland and Rockland, Me., triweekly, steamers *Merriconeag* and *Enterprise*, 165 tons each.

(3) To Augusta, Me., daily, steamer *Islander*, about 125 tons.

(4) To Bath, Me., daily, steamers *Nahanada*, *Damarin*, *Island Bell*, and *Wiwurna*, all about 100 tons, drawing from 8 to 8½ feet.

(5) To Gardiner, Me., steamer *Gardiner*.

(6) To Monhegan Island, steamer *Wawenoc*.

Besides all these steamers, four tugboats are constantly employed in the harbor.

The Boston steamer *Lincoln* and the steamers plying between Bath and Boothbay Harbor land at Lewis wharf, with 14 feet at low water at its end. This wharf was recently extended 100 feet, by authority of the Secretary of War. At this wharf a coal business is carried on, handling about 1,100 tons of coal annually.

The steamer *Islander* lands at Simpson & Perkin's wharf, which has only 5 feet at mean low water. The steamers *Enterprise* and *Merriconeag* land at K. H. Richard & Co.'s wharf, where there is about 10 feet of water at low water. On the east side of the harbor, opposite the above-named wharves, is one wharf belonging to P. G. Pierce, who carries on a coal business, handling about 1,000 tons annually. This wharf has 9 feet of water at low water, and small vessels only can be employed in freighting coal.

At the Poole wharf (on the west side), where the cold-storage building is located, there is only 6 feet at low water, not a sufficient depth for fishermen to come alongside, and all the bait and other supplies have to be taken on board by small boats.

Southeasterly of Poole's wharf, the last wharf of any importance on the west side of the harbor, the bottom gradually rises to within 4 feet below mean low water as far as a small island, which can be considered the limit of Boothbay upper harbor.

In order to give more anchorage room for the many vessels which anchor in the upper harbor, and there relieve the channel of approach to the wharves from the crowded condition mostly prevailing, the people desire to have the shoal ground in front of their wharves sufficiently deepened to accommodate the vessels frequenting this place. The area desired to be deepened is about 1,200 feet long and 400 feet wide.

The quantities necessary to be removed to give 16 feet of water over the area considered necessary for anchorage and unobstructed approach to the wharves, from a rough estimate based on the depth shown on the United States Coast Survey chart, No. 315a, will not exceed 200,000 cubic yards (scow measurement) of easily dredged material, at 15 cents per cubic yard, or $30,000.

The shipping in tonnage per year sums up as follows:

Goods received, 23,050 tons; goods shipped, 53,950 tons, or a total tonnage of 77,000 tons.

In consideration of the present and steadily increasing commerce carried on at Boothbay Harbor and the urgent need of more room and deeper water in the upper harbor, I respectfully recommend that this improvement be undertaken by the General Government. I would also recommend that a harbor line be established previously to any contemplated work.

A survey of the harbor would cost about $600.

Very respectfully, your obedient servant,

A. C. Both,
Assistant Engineer.

Maj. S. W. Roessler,
Corps of Engineers, U. S. A.

SURVEY OF BOOTHBAY HARBOR, MAINE.

United States Engineer Office,
Portland, Me., December 20, 1899.

General: I have the honor to submit the following report of a survey of Boothbay Harbor, Maine, made under the provisions of the river and harbor act of March 3, 1899, with a view to its improvement in the interest of navigation.

Boothbay Harbor lies at the head of a deep indentation in the coast line 11 miles northeast of the mouth of the Kennebec River. The entrance between headlands is exposed to heavy seas only from the south, and from these the harbor proper is well protected by outlying islands. The tidal currents are not great, and the locality is easily accessible in all gales that would set up a heavy sea and drive vessels into harbor. For these reasons it is much resorted to as a harbor of refuge by coastwise vessels, and at almost any time in uncertain weather a large fleet of sailing vessels may be found anchored in the shelter of this harbor. It is the principal harbor of refuge between Portland and Penobscot Bay, and it is also quite a busy port commercially. Locally the harbor may be divided into two parts—the outer harbor, which is used exclusively as a harbor of refuge, and the inner harbor, upon which all the wharves are located.

The preliminary examination of this harbor, submitted under date of August 18, 1899, showed that only the upper or inner harbor in front of the wharves needed attention, and the survey was therefore limited to that locality. The results of this survey are shown on the accompanying tracing.

It was claimed at the time the preliminary examination was made that steamboats landing at the wharves on the westerly side of the harbor sometimes grounded at extreme low-water stages. Upon further inquiry while the survey was being made it developed that this report applied practically to only one boat, not now in the trade, drawing 12 feet, which touched here during the summer and sometimes grounded alongside the wharf, but inside the line up to which the Government might, under any circumstances, be expected to dredge. The map shows that outside the line of the ends of the main wharves there is water enough at almost any stage of the tide for the class of steamboats touching here. No complaint has been received that the depths are not sufficient for sailing vessels doing business at this point. As the results of the survey show that there is more water outside the line of the ends of the wharves than there is alongside the wharves there is no necessity for dredging in the interest of vessels going to the wharves. In the area used as an anchorage the depths are ample.

From the above facts the conclusion is drawn that the harbor is an important one, but so well favored by natural advantages as to require no artificial works of improvement at the present time in the interest of navigation. No project is therefore submitted.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, December 21, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

A 20.

EXAMINATION AND SURVEY OF KENNEBEC RIVER, MAINE, BETWEEN GARDINER AND AUGUSTA.

[Printed in House Doc. No. 262, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, January 6, 1900.

SIR: I have the honor to submit herewith copies of reports of August 25 and December 19, 1899, with map,[1] by Maj. S. W. Roessler, Corps of Engineers, upon preliminary examination and survey, respectively, of Kennebec River, Maine, between Gardiner Bridge and Augusta Dam, with a view to securing a channel equal in capacity to that below said bridge, made to comply with the requirements of the river and harbor act of March 3, 1899.

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[1] Not reprinted. Printed in House Doc. No. 262, Fifty-sixth Congress, first session.

In the opinion of Major Roessler the river has already received the greatest amount of improvement in the interest of low-water navigation that could be obtained without resort to canalization, but that a still further improvement is worthy in the interest of high-water navigation, and the project now presented is based entirely upon the needs of high-water traffic.

Under a project completed in 1898 a channel was made 125 feet wide and 12 feet deep at mean low water for about 3 miles above Gardiner, and a channel 100 feet wide and 10 feet deep at mean low water in the remaining portion. This channel has deteriorated considerably, and the plan now presented contemplates the widening of the channel all the way to Augusta to 125 feet and the clearing out and deepening of the old dredge channel to a depth of 16 feet at mean high water, which will give a depth of about 11 feet at mean low water. The estimated cost of this work, including contingencies, is $81,000.

Major Roessler suggests that if this project be adopted by Congress it be done with the proviso that, in the event of encountering any considerable quantity of ledge in the execution of the project, beginning at Gardiner and working upstream, the depth or width may be modified above that point, in the discretion of the Secretary of War, in order to avoid expensive ledge excavation.

The views of the local officer are concurred in by Col. G. L. Gillespie, Corps of Engineers, Division Engineer.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF THE KENNEBEC RIVER, MAINE, BETWEEN GARDINER BRIDGE AND AUGUSTA DAM, WITH A VIEW TO SECURING A CHANNEL EQUAL IN CAPACITY TO THAT BELOW SAID BRIDGE.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 25, 1899.

GENERAL: Complying with letter of March 10, 1899, from the Chief of Engineers, I have the honor to submit the following report of a preliminary examination of—

> Kennebec River between Gardiner Bridge and Augusta Dam, with a view to securing a channel equal in capacity to that below said bridge—

made under the provisions of the river and harbor act of March 3, 1899.

The river channel between the bridge at Gardiner and the wharves at Augusta is 6½ miles long and contains the following shoals:

Gages Shoal, just below the landing at Augusta.
Britts Shoal, beginning 1⅛ miles below Augusta.
Hallowell Shoal, beginning 2½ miles below Augusta.
Shepards Point Shoal, beginning 3 miles below Augusta.
Hinckleys Upper Shoal, beginning 3¾ miles below Augusta.
Hinckleys Lower Shoal, beginning 4¼ miles below Augusta.
Browns Island Shoal, beginning 4⅝ miles below Augusta.

Browns Island Shoal ends at a point about 5 miles below Augusta, and from this point for a distance of 1½ miles to Gardiner Bridge there was at the time of the last survey a least channel depth of 13 feet at mean low tide. In the unimproved condition of the river less than 3 feet of water could be carried to Augusta at low tide in the lowest stages of the river.

Congress early recognized the importance of improving this portion of the river, and made its first appropriation in 1827. Appropriations aggregating $18,500 were made between 1827 and 1852.

The next appropriation was one of $20,000, contained in the act of June 3, 1866, for improving the river from Augusta to Shepards Point. The project for expending this appropriation provided for deepening and straightening the channel by dredging and by removing bowlders across Hallowell Shoal and Shepards Point Shoal so as to give a bottom width of 75 feet and a depth of 8 feet at low tide at the lowest stages of the river. The same project provided for a careful hydrographic survey of the river from Gardiner to Augusta, and this survey being completed, the project was modified after 1868 so as to provide for a channel 100 feet wide and 8 feet deep at the lowest tides up as far as Hallowell, and 6½ feet (or 11 feet at high tide) from Hallowell to Augusta. This project was reported completed in 1871.

Under the provisions of the river and harbor act of 1886 a new survey was made of portions of the Kennebec River, including the section from Gardiner to Augusta, and a project approved for the further improvement of the river. This project, so far as it relates to the part of the river under consideration in this report, provided for excavating Hinckleys Lower Shoal to 10 feet at extreme low tide (corresponding to 12 feet at mean low water); then to dredge all the shoals to Augusta to a depth of 8 feet at extreme low tide (corresponding to 10 feet at mean low tide). This project was completed in 1898.

The combined length of the cuts through all the shoals is about 16,800 feet, and the combined length of the pools separating them about 9,600 feet. This portion of the river, therefore, closely resembles a canal with banks submerged, more or less, according to the stage of the tide and of the river. At the conjunction of low tide with low-river discharge the submergence of the banks in places is very slight and the position of the banks rendered discernible from the decks of steamboats going up the river.

I visited the locality on the 23d instant, and was fortunate in obtaining a trip over the river from Gardiner to Augusta at an unusually low stage, and therefore at a most favorable time for estimating the capacity of the river for further improvement. The principal facts that impressed themselves on my mind in going over the river were: First, that a boat drawing only 4 feet of water labored very perceptibly in going through the cuts; second, that the working of a wheel caused a depression in the water surface to such an extent as to cause a rush of water from the neighboring flats over the banks into the channel; third, that the banks of the channel were thus easily located the greater part of their length; fourth, that the natural discharge of the river seemed but little more than sufficient to maintain the banks of the canal full to overflowing, and lastly, and as a sequence to the above facts, that the channel already located here is about as capacious at low water as can be maintained under existing hydraulic conditions.

The improvement already made has had the effect of lowering the low-water slope and establishing a new low-water datum something below the low-water plane before the improvement was made. The depths resulting from the improvement are therefore something less than 8 and 10 feet, respectively, contemplated by the original project.

How much less can only be ascertained by new tide observations referred to the same bench mark as the original survey. Captain Lewis, of the steamer *Della Collins*, plying between Gardiner and Augusta, is of the opinion that the available depths now are but slightly greater than before the improvement was commenced.

That any further deepening of the channel, within reasonable limits, will result in any appreciable deepening of water at very low tide is therefore doubtful, and the conclusion may be enunciated that this part of the river has received all the improvement it is susceptible of in the interest of low-water navigation without resort to canalization.

As a means, however, of improving the high-water navigation—which constitutes the bulk of the traffic demanding improved navigation facilities—a further deepening of the channel is very worthy to be undertaken by the General Government. The principal traffic is in ice, lumber, and coal, and the quantities shipped from this river in a single year are large. A single firm in Augusta ships about 10,000,000 feet of lumber yearly and the city of Augusta imports yearly about 20,000 tons of coal, all of which arrives in comparatively light-draft vessels of 250 to 300 tons, because of the shoal water above Gardiner.

The extent of the improvement desired is an additional depth of 2 feet, which will give the channel between Gardiner and Augusta the same depth which it has below Gardiner. The estimated cost of the desired improvement can only be ascertained by a new survey of the channel already excavated and by an exploration of the bottom to ascertain the nature of the material to be excavated. Such a survey is recommended, and can be made for $500.

Attention is invited to the accompanying report of Mr. A. C. Both, assistant engineer.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 30, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer, and recommending that a survey be made for high-water improvement, at the estimated cost of $500.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
September 5, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Kennebec

River, Maine, between Gardiner Bridge and Augusta Dam, with a view to securing a channel equal in capacity to that below said bridge.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated with a view to improving high-water navigation, as proposed by Major Roessler.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

WAR DEPARTMENT,
September 7, 1899.

Approved as recommended by the Chief of Engineers.
By order of the Secretary of War:

A. N. THOMPSON,
Acting Chief Clerk.

REPORT OF MR. A. C. BOTH, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 8, 1899.

MAJOR: In compliance with instructions contained in your letter of July 15, 1899, to make a preliminary examination of Kennebec River, Maine, between Gardiner and Augusta, provided for in the river and harbor act of March 3, 1899, I proceeded to that place on July 21, 1899, and have the honor to submit the following report:

The Kennebec River has been improved by the National Government during many years, the first appropriation being made as early as in 1827.

Under different projects the channels through the many obstructions were deepened to correspond to the increased draft of the vessels employed, so that now a navigable channel having a depth of 12 feet at mean low water is available as far up as Hinckleys Lower Shoal (about 2 miles below Hallowell).

Between this point and the city of Augusta (a distance of about 4 miles) there are: Hinckleys Upper Shoal, about three-eighths of a mile long; Shepards Point Shoal (at Hallowell), about seven-eighths of a mile long; Britts Shoal, a little over three-fourths of a mile long, and Gages Shoal (at and below Augusta), about five-eighths of a mile long.

A channel through these several shoals was dredged to a depth of 10 feet at mean low water, under a project completed July 14, 1898.

The principal business along the Kennebec River is the shipment of ice and lumber. The total Kennebec River ice crops housed last winter amounted to 856,000 tons.

The Augusta Lumber Company operates a large steam sawmill, located adjacent to and above the arsenal grounds at Augusta. This company ships about 10,000,000 feet B. M. of lumber yearly. The owners of this mill spent $1,500 eight or nine years ago for removing rocks from the channel leading up to their wharves, and recently $880 for dredging in front and near their property.

The city of Augusta uses yearly 20,000 tons of coal, all of which arrives by light-draft vessels of 250 to 300 tons.

The coal dealers inform me that the average freight rate per ton of coal to Augusta is $1.05, while the freight rate on coal for Gardiner, about 6 miles below and having a channel depth of 12 feet at mean low water, is from 80 cents to $1.

The dealers claim that they would save 10 cents per ton, or about $2,000, in freights if they had a channel 12 feet deep, same as at Gardiner and below. The Augusta Lumber Company claims that if coal could come up here in regular barges, and they could ship lumber in them on their return trips to New York and Philadelphia, they would save from $5,000 to $7,000 per annum.

Purrinton Brothers, coal dealers, handle about 6,000 tons of coal, and claim that they would save 25 to 30 cents per ton providing they could employ vessels of 500 to 600 tons, or the same class which can go as far as Gardiner, where there is a 12-foot channel.

The Knickerbocker Ice Company controls all the ice privileges above Gardiner Bridge, and as the ice above Gardiner is of an extra quality the prospects are that they will build additional ice houses here.

The capacity of all their present ice houses above Gardiner is 200,000 tons. The ice shipped from those of their houses which can be approached only by small vessels, costs from 5 to 10 cents more per ton freight, owing to delays occasioned by grounding and waiting for an opportunity to go over certain shoal places.

Last year one vessel loaded 819 tons of ice from the Old Orchard ice house just above Brown Island, where the channel has a depth of 12 feet. This is said to be the largest cargo ever taken from there, the vessel drawing 16.3 feet. Between Hallowell and Augusta, a distance of about 2 miles, probably no ice will ever be cut, owing to the fact that the sewage from the city of Augusta empties into the river at this place and contaminates the water for some distance.

At the present time a transfer steamer is employed to carry all the merchandise (arriving at Gardiner by the Boston steamers three times per week) from Gardiner to Hallowell and Augusta. The running expenses of this steamer are said to be about $1,000 per month, and it carries from 300 to 500 tons of freight per month, and more in the fall of the year. It is claimed that nearly the entire cost of running this transfer steamer would be saved if the Boston steamers could go up to Augusta direct.

One passenger and freight steamer, of about 150 tons, runs during the summer time between Augusta, Boothbay Harbor, and intermediate points. This steamer draws 8½ feet, and finds it difficult at times of low water to navigate in the 10-foot channel already dredged.

Towboats also complain that they often strike the bottom, and that they have broken several wheels.

From the above the traffic on the part of the river between Gardiner and Augusta sums up as follows:

	Tons.
Ice shipped, from 92,000 to 200,000 tons per year, or an average of	150,000
Lumber shipped, about 10,000,000 feet B. M., at 1½ tons per M	15,000
Coal received	20,000
All other merchandise received, about	3,000
Total traffic per year	188,000

The saving in freight charges claimed by the interested parties (provided a channel depth of 12 feet could be obtained up to Augusta) is:

On ice, 5 cents per ton for an average of 150,000 tons per annum	$7,500
On lumber, $5,000 to $7,000, or an average	6,000
On coal, at 10 cents per ton for 20,000 tons	2,000
On all other merchandise, amounting to about 3,000 tons for six months in the year, at $800 per month	4,800
Total expected saving in freight charges	20,300

which, at 4 per cent interest, represents a capital of $507,500.

The desired improvement consists in deepening the present 10-foot channel between Gardiner and Augusta so as to have a depth of 12 feet at mean low water.

In order to obtain such a channel it will be necessary to consider the lowering of the pools between the several shoals located between the two places mentioned. Such lowering of the river slope has undoubtedly taken place to a considerable extent during the several improvements, especially during the last 10-foot improvement, and is probably one of the main causes of the lack of depth in the channel at times of low water.

Should any further improvements be authorized, it will be necessary to collect sufficient and accurate data for ascertaining the probable lowering of the river slope, which will follow the dredging of a deeper channel, and therewith the depth of excavation necessary to procure 12 feet of water at low tide.

A rough approximation of the probable cost of this desired improvement has been made, including the probable deeper dredging necessary to secure a 12-foot channel through that portion of the river. It is as follows:

Removal of 185,000 cubic yards of gravel, rocks, etc., measured in situ, at 50 cents per cubic yard	$92,500
Engineering expenses and contingencies	9,500
Probable total cost of improvement	102,000

In consideration of the above statements it is my opinion that that part of the Kennebec River between Gardiner and Augusta is worthy of improvement by the General Government.

A survey including accurate lines of levels to determine the river slope would probably cost $1,200.

Very respectfully, your obedient servant,

A. C. Both,
Assistant Engineer.

Maj. S. W. Roessler,
Corps of Engineers, U. S. A.

SURVEY OF KENNEBEC RIVER, MAINE, BETWEEN GARDINER BRIDGE AND AUGUSTA DAM.

United States Engineer Office,
Portland, Me., December 19, 1899.

General: Complying with letter of September 9, 1899, from the Chief of Engineers, I have the honor to submit the following report upon the survey of Kennebec River between Gardiner Bridge and Augusta, Me., together with a project for the further improvement of the river between these points to the extent which in my judgment the river is susceptible of and the present and prospective commerce will justify.

This survey has been made in consequence of a clause in the river and harbor act of March 3, 1899, which provided for a preliminary examination of—

> Kennebec River between Gardiner Bridge and Augusta Dam, with a view to securing a channel equal in capacity to that below said bridge.

In the report of the preliminary examination which was submitted August 25, 1899, the opinion was expressed, in substance, that the river had already received the greatest amount of improvement in the interest of low-water navigation that could be obtained without resort to canalization, but that a still further improvement than that already accomplished was deemed worthy in the interest of high-water navigation. All information obtained since the preliminary examination confirms the correctness of this conclusion. The present project is therefore based entirely upon the needs of high-water traffic, although it will at the same time incidentally benefit the few small boats that ply the river at medium and low stages of water.

The survey was made in October and included a complete set of soundings over the entire stretch of river between the two points named, and a line of levels to connect the tide gauges at the extreme points. The work has been plotted upon five sheets to a scale of 1:2,000, upon which the proposed channel is indicated and from which the estimates have been made. To avoid the necessity of sending these sheets, which are in considerable detail, a map has been compiled on a scale of 1:10,000, which shows the location of the channel and the characteristic soundings. A tracing of the latter map accompanies this report.

The distance from Gardiner to Augusta is 6¾ miles. In this distance there are six shoals which form the obstructions to navigation. In their unimproved state but little over 3 feet could be carried over them at the lower stages of the river. Improvements have been made at various times since 1827 with a view of deepening the water on these shoals. The latest improvements have been made under the project of 1888, which provided for a channel 125 feet wide and 12 feet deep at mean low tide for about 3 miles above Gardiner and a channel 100 feet wide and 10 feet deep at mean low tide in the remaining portion. This project was completed in 1898.

The present survey shows that the channel then excavated has shoaled and decreased in width considerably, and at several points has become obstructed by bowlders which have rolled in from the sides or been carried there by ice. On account of these bowlders the limit of draft of vessels going to Augusta is 11 feet.

The improvement here proposed contemplates a widening of the channel to 125 feet all the way to Augusta and a clearing out of the old dredged channel and a further deepening so as to obtain a depth of 16 feet at mean high water. This will give a depth of about 11 feet at mean low water. It is also proposed to remove a small middle ground opposite Farmingdale and a small shoal at the entrance to the draw at Gardiner Bridge.

The total estimated quantity of excavation is 215,000 cubic yards, and the estimated cost 30 cents per cubic yard. The cost of the work, not including contingencies, is, therefore, $64,500. For contingencies of engineering, removal of ledge if any should be encountered, and large bowlders, the above amount should be increased by about 25 per cent, making the total cost about $81,000. This project is submitted as the greatest which, with present information, the river appears susceptible of and the present and prospective commerce will justify.

Soundings were taken at several points where it was thought ledge might be encountered. Excepting at one point, above Hallowell, where very hard material was encountered, no ledge was discovered. These soundings of necessity only extended over a small part of the river, and it is possible that ledge may exist where no soundings were made. Should ledge be encountered in any considerable quantity it may not be advisable to carry out this project to the full depth and width contemplated. If this project is adopted by Congress it is therefore suggested that it be done with the proviso that, in the event of encountering any considerable quantity of ledge in the execution of the project beginning at Gardiner and working upstream, the depth or width may be modified above that point, in the discretion of the Secretary of War, in order to avoid expensive ledge excavation. It is not believed that ledge exists within the limits of the proposed excavation, but that fact can not be definitely stated and hence the necessity of the above proviso.

The traffic to be benefited by the proposed improvement is very much less than that indicated in the preliminary examination, in the report of which the entire traffic of all description was embraced, including ice, which formed more than three-fourths of the entire river trade. This item should be entirely eliminated, as appears from further investigation. In fact, it would seem, from a careful inquiry made by Mr. F. S. Burrowes, assistant engineer in charge of the survey, that the only trade which would be benefited materially by the proposed improvement are receipts (annual) of about 18,000 tons of coal at Augusta and 8,000 tons at Hallowell, upon which a saving of about 25 cents per ton could be made on shipments to Augusta and 15 cents per ton on shipments to Hallowell, making a total saving of about $5,700 yearly. The Augusta Lumber Company ship yearly about 18,000 tons of lumber, but from their own statement it would appear that the proposed improvement would not benefit them greatly, as their business is carried on exclusively in light-draft vessels. While the direct benefit that will result from any further improvement is thus seen to be small, it is believed that the indirect benefit to the river trade generally, to the community, and to the manufacturing interests located at Augusta and Hallowell from an improved river navigation and cheaper rates will not be inconsiderable.

The work can be done most advantageously under one contract, under the continuous-contract system.

For details of the survey attention is invited to the report of Mr. F. S. Burrowes, assistant engineer, herewith.

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, December 20, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

REPORT OF MR. F. S. BURROWES, ASSISTANT ENGINEER.

Portland, Me., *December 18, 1899.*

Major: I have the honor to submit the following report on a survey of "Kennebec River between Gardiner Bridge and Augusta Dam, with a view to securing a channel equal in capacity to that below said bridge," river and harbor act, March 3, 1899.

As the highway bridge at Augusta, about one-half mile below the dam, is without a draw, it is the practical head of navigation, and was therefore made the upper limit of the survey. Former surveys show that to obtain a good channel between the bridge and the dam would require a large expenditure of money without any benefit to shipping interests.

The field work of the survey began October 4, and was completed October 31, except that a small party was engaged in testing the character of the bottom from November 28 to December 12.

Detailed surveys of this portion of the river have been made in 1867-68, and again in 1887, but as the survey points had practically all been destroyed it was found advisable to make a new triangulation, the stations being marked for the most part by drill holes in ledge or bowlders. For purposes of study, and for the estimates, the survey was platted on five sheets to a scale of 1:2,000, and these tracings are on file in this office. To accompany the report a map of the survey was made to a scale of 1:10,000, which shows in a more compact and convenient form all the essential data obtained. Where no changes have occurred the shore line was taken from maps of previous surveys, but at Augusta, Hallowell, Farmingdale, and Gardiner the wharf lines were relocated.

PLANE OF REFERENCE.

A line of levels was run from Gardiner to Augusta, and four gauges set at approximately equal intervals along the river, one each at Augusta, Hallowell, Rich's ice house, and Gardiner. The zeros of the gauges were set on a level with the plane of mean low tide at Gardiner, as obtained from a bench mark established by the Coast Survey at that point. From observations of high and low water for five consecutive days on these gauges, it was found that the average high water at Gardiner was 4.54 feet, and at Augusta 4.63 feet, showing that the high-water plane at that time was practically level from Gardiner to Augusta, the difference in reading being not more than the probable error in the line of levels.

The average low-water reading at Gardiner was found to be —1.19 and Augusta —0.24, showing a slope of 0.95 feet in the low-water plane from Augusta to Gardiner.

At the time of the survey the river was exceptionally low, and it is therefore more than probable that the mean range of tides, as given by the Coast Survey as 5.1 feet at Gardiner, is correct for the whole season of navigation.

Deep-draft vessels, carrying coal, etc., from Gardiner to Augusta, only use the river at high tide, and it was therefore determined to make the plane of depth of proposed improvement parallel to the level high-water plane, rather than to the inclined low-water plane. A level plane passing through the established mean low tide at Gardiner has therefore been assumed as plane of reference for soundings and improvement.

For the previous surveys the lowest water observed in 1867 was used as the plane of reference, and as nearly as could be ascertained this plane at Hallowell was 1.5 feet below the plane used on this survey.

PROPOSED IMPROVEMENT.

The distance from the Augusta Bridge to the Gardiner Bridge is 6¾ miles, and in this distance there are six main shoals which, beginning at Augusta, are known as Gages, Britts, Hallowell, Shepards Point, Hinckley, and Browns Island shoals. Channels have been dredged through these shoals at various times to a depth of 10 feet at mean low tide and width of 100 feet in the upper part of the river, and to a depth of 12 feet at mean low tide with a width of 125 feet in the lower part. These channels have since shoaled considerably and have decreased in width very much since they were last dredged. At several points there are large bowlders in the channel on which the small steamboats plying the river have struck, and on several occasions broken propeller blades have been the result. These bowlders have probably rolled in from the side, or possibly have been carried there by the ice. On account of these bowlders, only vessels drawing not more than 11 feet of water can be taken as far up as Augusta.

The following estimate is based on obtaining a channel through all the shoals 11 feet deep at mean low water, or 16 feet deep at mean high water, and 125 feet wide, with a slightly increased width in the bends. The width is also increased in front of the wharves at Augusta and Hallowell in order to form turning basins at those places.

It is also proposed to remove a small middle ground opposite Farmingdale and a very small shoal at the entrance to the draw at Gardiner Bridge to the same depth.

The classification of the material to be removed was determined from tests of the bottom made in Gages, Britts, Hallowell, and Shepards Point shoals and from reports of previous dredging through shoals below.

Estimate for obtaining channels 11 feet deep and 125 feet wide.

	Cubic yards.
Gages Shoal, loose gravel, sand, and bowlders	63,000
Britts Shoal, loose gravel, sand, and bowlders, mud, and possibly some rock	74,000
Hallowell Shoal, loose and compact gravel, sand, and bowlders	26,000
Shepards Point Shoal, loose and compact gravel, sand, bowlders, clay, and mud	26,000
Hinckley Shoal, sand, gravel, bowlders, and clay	17,000
Browns Island Shoal, sand, gravel, and bowlders	7,000
Farmingdale Shoal, probably same as Browns Island Shoal	1,500
Gardiner Bridge Shoal, recent deposit	500
Total	215,000

measured in scows, at 30 cents =	$64,500	
Add about 25 per cent	16,500	for contingencies of engineering and superintendence and removal of ledge and large bowlders which may be encountered.
Total	81,000	

The quantities were obtained by calculation of the place measurement to one-half foot below grade, allowing for 45-degree, side slopes, and then adding about 5 per cent for expansion.

As the available channel depth below Gardiner is 12 feet at mean low tide, and in order to comply with the wording of the act, the survey and first estimate were made with a view of continuing this depth to Augusta; but tests of the bottom with an iron rod at intervals of 400 or 500 feet along the channel, while not discovering the presence of a large amount of ledge above the 12-foot plane, seemed to indicate that 11 feet was the greatest depth to which the improvement could be made without encountering large bowlders and hardpan in considerable quantities, and possibly some ledge. The commerce of this part of the river was also a factor in determining the proposed depth of the improvement.

To obtain a depth of 12 feet would require the removal of about 85,000 cubic yards, measured in scows, of very hard material in addition to the above estimate.

Commercial statistics.

	Receipts.	Shipments.
AUGUSTA.	*Tons.*	*Tons.*
E. Stone & Co., coal	10,000	
Purinton Bros., coal	5,000	
C. H. Cunningham, lime, cement, etc	1,000	
Maine State Insane Asylum, coal	2,000	
Augusta Lumber Company, lumber		18,000
Total	18,000	18,000
HALLOWELL.		
Frank S. Wingate, coal	4,000	
Hamilton & Co., coal	4,000	
Hallowell Granite Company, granite		5,000
Total	8,000	5,000

Should the proposed improvement be carried out, the freight rates to Augusta and Hallowell would probably be about the same as to Gardiner, with the cost of additional towing added, with a consequent saving equal to the present rates from Gardiner up, less the additional towing.

It is not probable that the improvement will cause any considerable saving in freight on shipments.

According to the information at hand this would indicate an annual saving on receipts of about 25 cents per ton on 18,000 tons at Augusta, or $4,500, and 15 cents per ton on 8,000 tons at Hallowell, or $1,200, making a total saving of $5,700, which at 4 per cent would represent an invested capital of $142,500, or the estimated annual saving would be about 7 per cent of the estimated cost of the improvement.

There is only one ice house (on Shepards Point, capacity about 20,000 tons) above the vicinity of Browns Island, and this house has not been emptied for two years. The improvement of the river will not be of any appreciable benefit to the ice traffic as far up as Browns Island. The ice business, although at one time large on this part of the river, is therefore not considered in determining the necessity for the improvement. In reference to the steamboat service between Gardiner and Augusta, Mr. James B. Drake, president of the Kennebec Steamboat Company, which runs large boats daily during the summer from Gardiner, Me., to Boston, Mass., and a small boat in connection therewith from Gardiner to Augusta, stated that the present arrangement was satisfactory and that he had no desire to run his large boats through to Augusta. The clear width of the draw in the bridge at Gardiner is barely 65 feet, and the large Boston steamboats now in use on the line are 65 and 66 feet in width, so that to continue the service direct to Augusta either the draw would have to be widened or narrower boats put on the line.

Very respectfully, your obedient servant,

F. S. BURROWES,
Assistant Engineer.

Maj. S. W. ROESSLER,
Corps of Engineers, U. S. A.

A 21.

EXAMINATION AND SURVEY OF PARKERS HEAD HARBOR AND CHANNEL, KENNEBEC RIVER, MAINE.

[Printed in House Doc. No. 276, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, January 8, 1900.

SIR: The river and harbor act approved March 3, 1899, makes provision for a preliminary examination and survey of Parkers Head

Harbor and Channel, Kennebec River, Maine, and I now have the honor to submit the accompanying copy of report of examination, dated August 14, 1899, and of report dated December 21, 1899, with map,[1] giving the results of a survey of this locality made by Maj. S. W. Roessler, Corps of Engineers.

At the time the examination was made it seemed best to withhold judgment as to the merits of the proposed work until further investigation should admit of a more reliable opinion as to the scope of improvement justified by the commercial interests involved.

The improvement desired is a channel about 100 feet in width and 12 feet in depth at mean low water, with a turning basin at the upper end to connect the wharf at the head of the bay with deep water in the Kennebec River. The cost of such a channel and basin is estimated at $20,000, but from the further information obtained in connection with the survey Major Roessler is of the opinion that Parkers Head Harbor and Channel are not worthy of improvement by the General Government at the present time. The views of the district officer are concurred in by the division engineer, Col. G. L. Gillespie, Corps of Engineers.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF PARKERS HEAD HARBOR AND CHANNEL, KENNEBEC RIVER, MAINE.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 14, 1899.

GENERAL: I have the honor to submit the following report of a preliminary examination of "Parkers Head Harbor and Channel, Kennebec River, Maine," made under the provisions of the river and harbor act of March 3, 1899.

Parkers Head Harbor is a small bay on the west bank of the Kennebec River, about 3¼ miles above its mouth. The whole area is a large flat, bare at low tide, except along the depression or channel which connects the deep water of the river with Parkers Head village at the head of the bay. This channel is 200 to 300 feet wide, about 6 feet deep at average low tide, and about 2,600 feet long. Being usually free from ice, it is much used as an anchorage ground during the winter months by small vessels, hence the name harbor.

Abreast of the village is a dam where formerly was located a large tide sawmill operated by the waters impounded above the dam at high tide. After the destruction of the mill by fire, the dam was closed, and the pond becoming fresh was afterwards used as an ice field from which has been harvested an average of about 26,000 tons of ice yearly, from 1860 to 1890. Since 1890 no ice has been shipped from this point because the water in the channel of approach to the dam is not deep enough to admit the large and deep-draft vessels such as carry on navigation in this locality in the winter season. There are no ice houses here, and all the ice harvested for shipment is placed directly on board vessels. The annual possible yield is estimated at about 300,000 tons. The privilege of cutting is owned by the Parkers Head Ice Company, which would be the chief beneficiary of any improvement that might be made at this point.

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[1] Not reprinted. Printed in House Doc. No. 276, Fifty-sixth Congress, first session.

The village of Parkers Head is said to contain about 150 inhabitants, and the neighboring community within a radius of about 3 miles of the village 250 more residents. The means of communication with Bath, 10 miles distant, is by a country road, and by a small steamer plying between Bath and Popham Beach during a greater part of the year. The small steamer used in the early spring and late fall is replaced by a larger one during the busy months of summer which can reach Parkers Head village only when the tide is high. As the boat runs upon schedule time there are not many occasions when it can reach the wharf, and then lighterage or drayage to the vessel at the nearest accessible landing is resorted to, causing extra expense, estimated at $3 per ton.

The ordinary amount of business of the village has been stated to be about 900 tons, and a saving of $3 per ton upon this amount would represent a saving of about $3,000 per year to the community. The improvement desired is a deepening of the present channel to the depth of about 12 feet at average low tide, and a width of 150 feet so as to admit the local steamers at all stages of the tide, and deep-draft schooners for freighting of ice. Whether or not the improvement should be undertaken by the General Government depends, in my judgment, more upon the annual ordinary business of the village than upon the amount of ice that may be harvested in the vicinity, since the latter industry is controlled by a single corporation, which, rather than the general public, would be benefited by the improvement. Whether or not the improvement should be undertaken by the United States will depend upon its cost, and this can be ascertained only after a survey and examination.

Should the material to be removed consist largely of mill waste, such as slabs, edgings, or of hard deposit difficult and expensive to remove, and the probable cost be considerable in proportion to the interest involved, the improvement should not be undertaken. But, on the other hand, should the material be found to be soft and easy and cheap to excavate, and the estimated cost well within the figure that the saving of charges to the community would justify, the desired improvement would be a worthy one in behalf of the general public.

In view of the above facts I withhold an expression of opinion as to the merits of the improvement until a survey and estimate of cost have been made. A survey suitable for ascertaining all of the facts can be made for $500. Mr. A. C. Both, assistant engineer, made the examination on the ground, a copy of whose report is herewith.

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 17, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer respecting this locality, and recommending that a survey be made at an estimated cost of $500.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 19, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Parkers Head Harbor and Channel, Kennebec River, Maine.

It is recommended that a survey be made, after which a more reliable opinion can be formed as to the scope of improvement justified by the commercial interests involved.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

REPORT OF MR. A. C. ROTH, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Portland, Me., August 4, 1899.

MAJOR: In compliance with instructions contained in your letter of July 15, 1899, to make a preliminary examination of Parkers Head Harbor and Channel, provided for in the river and harbor act of March 3, 1899, I proceeded to that place on July 19, 1899, and have the honor to submit the following report:

Parkers Head Harbor is located about 3¾ miles above Pond Island Light, at the mouth of the Kennebec River, and about 2½ miles above Fort Popham, Me.

The harbor is formed by an indentation in the westerly shore line of the Kennebec River, and the channel which leads up to the head of this cove, where Parkers Head village is located, has a length of about 2,600 feet, an average depth of about 6 feet, and is about 200 to 300 feet wide. (U. S. Coast Survey chart No. 314 gives the depth of water in this channel as 11 to 12 feet.) This channel is well sheltered on all sides and is used much for anchoring vessels during winter on that account, as well as for the reason that at rare intervals only it is obstructed by ice.

From the present head of navigation the cove formerly extended northward for about 1 mile. A small stream called the Duley and Kelly Brook, about 2 miles long, enters into this cove. Later a dam was built from Parkers Head village across the cove to the southerly point of Parkers Head, a distance of about 800 feet, and the waters thus impounded (having an area of about 250 acres) were utilized for many years to furnish power for a large tide sawmill, running eighteen hours out of twenty-four and employing eleven single saws. After the destruction of the mill by fire the dam was closed up, the pond became fresh, and has since been used for harvesting ice.

About 175 acres are available for cutting from 200,000 to 300,000 tons of ice of good quality. From 1860 to 1890 from 25,000 to 27,000 tons of ice were cut yearly, with a maximum of 40,000 tons. Since 1890 no ice has been cut here, owing to the fact that only small light-draft vessels can come up the channel to the ice runs at the dam to load. The freight charges of these small vessels are from 65 to 85 cents per ton, while large vessels of deeper draft freight ice at about 50 cents per ton. Furthermore, I was told that all freight charges in winter are about 10 per cent lower than in summer, and therefore if facilities were such as to admit larger vessels to load at the dam, ice from here could be shipped at a minimum rate.

As opportunities for loading ice in winter direct from the fields into vessels ready for shipment are not numerous, and as the close proximity of this privilege to deep water makes this place one of peculiar advantages, the owners anticipate that they could sell and ship the entire ice product of the pond, or about 300,000 tons annually, provided they could employ vessels of larger capacity and deeper drafts. The vessels available during winter are said to be three and four masters, drawing from 16 to 18 feet; small vessels, as a rule, are laid up during the winter months, but, if available, would charge so much higher rates than larger vessels that for this reason they are not employed. Ice is sold now delivered at destination, and any reduction in freight is a benefit to the shippers. The Parkers Head Bay Ice Company owns and controls the ice privilege, the piers and ice runs, a farm of 250 acres, and the privileges of the Duley and Kelly Brook. I learned from this company that it has often sold ice for stumpage to other parties. From the middle of the dam three ice runs with piers at their ends are built to the present channel. Two of these, 135 feet long each, are in fair condition, and one about 500 feet long is very much dilapidated and unfit for use. At the piers the depth of water at low tide is about 6 feet, but between the two short piers, nearest the shore, there is a shoal with only 2 feet of water at low tide. The shoaling which has taken place (since the survey made by the Coast Survey) was undoubtedly caused by mill waste and refuse from the old sawmill. With the destruction of this mill the accumulation of slabs, edgings, and sawdust has ceased, and it is believed that any improvement made here in future can be considered as permanent.

Within a mile from the wharves there is a good granite quarry, from which stone was furnished for public and private buildings. This stone at that time was loaded directly into small vessels, which would go up to the quarry before the dam was built. It is claimed that if the shipping facilities were improved this quarry could be connected with the wharves by a gravity railroad track, and worked to good advantage. There are no mills or other manufacturing establishments. It is also said that the Duley and Kelly Brook can easily be made to furnish two water powers of 75 horsepower each, by two inexpensive dams, and that several parties have considered these sites, but discarded them at present for lack of transportation facilities.

The means of communication with Bath, about 10 miles distant, is by wagon road, and by a small steamer that runs between Bath and Popham Beach the larger part of the year, touching at Parkers Head village only when the stage of tide admits. During midsummer a much larger steamer is put on this route, which does not touch at Parkers Head village, owing to its great draft, thus cutting off all water communication during that time. One party informed me that he had shipped from 60 to 75 barrels of clams per day to the Boston market, which he had to do by lightering to Bath or Popham Beach at an additional expense for six months in the year. Another party now ships about 10 tons of fish, while he could easily handle and ship 100 tons if facilities were better.

The population of the village proper is said to be about 150, and the community within a radius of 3 miles around the village has an additional population of about 250. All the supplies for this community now have to be transported by team from Popham Beach, Bath, or Small Point at a great increase of expense, said to amount to about $3 per ton.

There are two stores in the village which together handle approximately the following goods per year:

	Tons.
Flour, 1,000 barrels, at 210 pounds	100
Molasses, 10 hogsheads, at 1,800 pounds	9
Corn, meal, and oats, 7,800 bags, at 100 pounds	390
Coal	[1]150
Pork and lard, 110 barrels, at 400 pounds	22
Oil, 150 barrels, at 350 pounds	25
All other goods	150
Total	846

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[1] With ample facilities this amount would be 1,000 tons.

A saving of $3 per ton freight on 846 tons will amount to	$2,538
Total capacity of ice pond, say 250,000 tons, valued at 75 cents per ton, would represent an income of $187,500. Sixty per cent of this amount at least, or about $112,500, would be paid out to the community for labor of cutting and loading the ice. A reduction of freight of 15 cents per ton would result from employing large vessels, amounting to a saving of	37,500
Total amount saved by reduction of freights annually	40,038

It is also claimed, and apparently with good reason, that, providing regular communication could be secured, the country surrounding Parkers Head village, which, by the way, is not well adapted to agriculture, but is picturesque, high, and with rocky shores, would be selected for summer homes, resulting in increased value of land, taxes, and income to the community.

The improvement desired by the people of Parkers Head village and vicinity is the deepening and straightening of the channel from Kennebec River to the ice runs at the dam, a distance of about 2,600 feet, so that vessels from 16 to 18 feet draft can come up and load there. It is believed that a channel 150 feet wide and 12 feet deep at mean low water, terminating in a turning basin about 300 feet diameter near the ice runs, will answer all the requirements. From a rough approximation of quantities, it is believed that a channel of the above dimensions can be obtained by the removal of about 120,000 cubic yards of soft mud, slabs, and edgings, at 15 cents per cubic yard, or about $18,000 for the improvement.

There is no reason to anticipate deterioration of this channel after being once dredged, and the improvement could be considered as permanent. There is a small wharf, called the town wharf, close inshore, where a small steamer, plying between Bath and Popham Beach, lands passengers and freight when the tide serves. At low water the bottom is bare in front of this wharf. It is the intention of the town people to build a new wharf to the new channel, should it be authorized.

From the above it will be seen that the saving in freight on merchandise received and ice expected to be shipped would amount to about $40,000 per annun, which, at 4 per cent interest, would represent a capital of $1,000,000. As the total approximate cost of the desired improvement would be about $18,000 only, it is believed that the general benefit to the community would warrant the expenditure of that sum, and I recommend that this improvement be undertaken by the General Government.

A survey of the locality in question would cost about $500.

Very respectfully, your obedient servant,

A. C. Both,
Assistant Engineer.

Maj. S. W. Roessler,
Corps of Engineers, U. S. A.

SURVEY OF PARKERS HEAD HARBOR AND CHANNEL, KENNEBEC RIVER, MAINE.

United States Engineer Office,
Portland, Me., December 21, 1899.

General: I have the honor to submit the following report of a survey of Parkers Head Harbor and Channel, Kennebec River, Maine, made under the provisions of the river and harbor act of March 3, 1899, with a view to its improvement in the interest of navigation.

Parkers Head Harbor is a small bay on the west bank of the Kennebec River, about 3¼ miles above its mouth. At the head of the harbor, and at a distance of about 3,000 feet from deep water in the river, is located Parkers Head village, and abreast of the village is a dam above which is a fresh-water pond from which about 26,000 tons of ice were harvested and shipped yearly between 1860 and 1890. The improvement desired is a channel about 100 feet in width and 12 feet in depth at mean low tide, with a turning basin at the head, to connect the wharf at the head of the bay with deep water in the Kennebec River.

In the preliminary report of August 14, 1899, the opinion was expressed that any improvement that might be deemed advisable here would depend more upon the ordinary annual business of the village proper than upon the amount of ice that might be harvested in the vicinity, because of the ownership of the ice privilege by a single corporation, which, rather than the general public, would be benefited by the improvement.

From further inquiry as to the situation here, and from the results of the survey, I am now of the opinion that this locality is not worthy of improvement by the General Government at the present time. My reasons are briefly as follows:

(1) Compared with that shipped ten or more years ago, the quantity of ice sent out from the Kennebec River the past season has been comparatively small. One reason, and the only plausible one, offered for these small shipments is that the ice industry on the Kennebec, as upon other rivers in this locality, has passed into the hands of a combination or trust which has found it more profitable to draw its supply of ice from other sources. If the above explanation is correct the prospect for renewed activity in this business is by no means hopeful, and it is unlikely that any new ice industries, such as that at Parkers Head Harbor, would be started under existing conditions.

(2) Even if the ice were again cut at this point the benefit resulting from any improvement would be largely in the interest of a private corporation; and

(3) The navigation to Parkers Head village is too small at the present time to justify the expenditure of the amount that would be required to develop the desired channel from the village wharf to deep water in the Kennebec. The cost of such a channel would be, approximately, $20,000.

Attention is invited to the report of Mr. F. S. Burrowes, assistant engineer, herewith, and to the accompanying tracing.

Very respectfully, your obedient servant,

S. W. Roessler,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, December 22, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

REPORT OF MR. F. S. BURROWES, ASSISTANT ENGINEER.

United States Engineer Office,
Portland, Me., December 21, 1899.

Major: I have the honor to submit the following report upon a survey of Parkers Head Harbor, Maine, made under your directions, November 1-7, as called for by river and harbor act of March 3, 1899:

Parker Head Harbor, so called, is a channel running through the flats from the

Kennebec River to the village of Parkers Head, a distance of about one-half mile. At the village there is a dam across the stream which forms a large fresh-water pond. Originally this dam was built to furnish power to sawmills, but latterly the pond has been used for cutting ice, which was loaded directly into vessels and shipped south in the winter time. The engine house and runs for loading the ice still remain, but are in a state of decay, as for various reasons the business has not been carried on in recent years.

A small steamboat plying between Bath and Fort Popham touches at Parkers Head village whenever the tide is high enough. At other times passengers are sent ashore in a small boat, or passengers and freight are landed at Fort Popham and then taken around by team to Parkers Head village.

The survey was plotted on a scale of 1:2,000, and a tracing of the map is submitted herewith. The soundings are reduced to plane of mean low tide, which is referred to two established bench marks. Twenty-two tests of the bottom were made with an iron rod, the locations of which are indicated on the map, and the depths, penetration, and character of the material are shown in tabulated form thereon. The outlines of the Kennebec River, from its mouth to Parkers Head—taken from Coast Survey chart No. 314, scale 1:40,000—are also shown on the tracing.

The character of the material is nearly all very soft mud (the rod being pushed down by hand in most places), except at the extreme upper part, where slabs, edgings, and some rocks are encountered.

A resumption of the ice business would be the only cause that would possibly justify the improvement, and for this the low-tide depth should not be less than 12 feet.

To obtain a channel of this depth 100 feet wide and about 2,000 feet long, widened at the entrance and with a turning basin at the upper end having a width of 250 feet and an average length of about 400 feet, would require the removal of 130,000 cubic yards of material, measured in scows, which, at 14 cents per cubic yard, would amount to $18,200. This, with an addition of about 10 per cent for contingencies, would make the total cost of the improvement $20,000.

The turning basin is made to include about 100 feet of the outer end of the long ice run, which would have to be removed. If the improvement were carried any closer to the dam, hard material and possibly ledge would be encountered.

The channel and turning basin on which the estimate is based are indicated on the tracing.

Very respectfully, your obedient servant,

F. S. Burrowes,
Assistant Engineer.

Maj. S. W. Roessler,
Corps of Engineers, U. S. A.

A 22.

MODIFICATION OF HARBOR LINES AT ROCKLAND HARBOR, MAINE.

United States Engineer Office,
Portland, Me., April 24, 1900.

General: For reasons stated below, I have the honor to recommend changes in the harbor line at Rockland, Me., as indicated on the accompanying tracing.[1]

The present harbor line is shown in black, and was approved by the Secretary of War December 26, 1895. A project for improving the harbor by dredging was approved by the Chief of Engineers June 25, 1897. This project included dredging at the end of Tillson's wharf, and in both coves north and south of Crocketts Point. The dredging was to extend to the established harbor line and to be carried to depths as follows: At the end of Tillson's wharf to a depth of 13 feet below mean low water; in South Cove to a depth of 6 feet, and in North Cove to a depth of 6 feet, except in the small bight at the head of the cove, where the depth was to be only 4 feet below mean low water. A contract for this work was entered into with Moore & Wright of Portland, Me., May 16, 1898. The dredging at the end of Tillson's wharf and in South Cove was completed before beginning work on North Cove. By September, 1899, dredging in the latter cove had advanced to a point opposite Ames's wharf when ledge "F" was encountered, which ledge was not indicated upon the original charts. Not appreciating the importance of its presence, the inspector failed to immediately report its discovery, and a portion of it was uncovered before its existence was made known to me. As soon as particulars were received, dredging was suspended with the consent of the contractors and a survey begun to ascertain the extent of the ledge and the possible existence of others, with a view of making such changes in the harbor line and in the area and depth of dredging in the head of the cove as the shape of the rock bottom and shore might suggest. The surveys which followed located ledge No. 11 at the extreme upper end of the cove and an extensive ledge beginning at and extending north from Crocketts Point. The portions of this ledge which lie outside the harbor line and above a plane 7 feet below low water (1 foot below plane of dredging) are indicated on the map as ledge No. 1 and ledge "F." The portion of this ledge between the 7-foot contours is irregular in shape and contains points that have a depth of only 4.8 feet below low water.

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[1] Not printed.

These ledges are not shown on the maps which were used in locating the present harbor line and in planning the extent of dredging to be done. Had their existence and outlines been known as they are known now, it is very probable, indeed almost certain, that the harbor line at Crocketts Point and at the head of the cove would have been drawn approximately in the location as indicated in red, so as to avoid the relatively large and indeed unnecessary expense of removing these ledges. To remove ledge No. 1 to a depth of 1 foot below dredging in the vicinity would require the removal of about 1,800 cubic yards of rock, at an estimated minimum cost of $18,000. To remove ledge No. 2 to a corresponding depth would require the removal of about 2,500 cubic yards, at an estimated minimum cost of $25,000. My reasons why these rocks should not be removed are two, viz:

1. The cost is, in my judgment, excessive in proportion to the advantages that would result; and
2. The benefits would be local rather than general.

The proposed change in the harbor line in the vicinity of ledges Nos. 1 and 2 have been under consideration by the interested people of Rockland for over five months. Naturally the contemplated changes met with opposition, since, if adopted, they would require the extension, at more or less cost, of certain wharves in order to reach deep water. Several conferences followed, more or less public, between interested persons and myself, and finally a public meeting was held on March 28, 1900, at Rockland, Me. As a result of this last meeting and further correspondence I am pleased to inclose a letter of the 13th instant from the Rockland-Rockport Lime Company, owners of all but one kiln at Crocketts Point, from which it will be seen that not only is opposition withdrawn to the proposed new harbor line in the vicinity, but approval given to this line as "the best that can be made under existing conditions and for the benefit of all concerned." As regards ledge No. 2, at the head of the cove, the only persons who have appeared to be specially interested in its removal are two owners of adjacent property, one of whom preferred not to have it removed; the other desired that it be removed. The interests that would be benefited are purely local and, in my opinion, are not of sufficient importance to justify serious consideration in connection with so costly an improvement as would be the removal of the ledge.

In view of the above facts, I respectfully recommend that the harbor line at Crocketts Point and at the head of the cove be changed and be given a new location, as indicated in red.

A third change advocated by adjacent wharf owners is desired on the north side of North Cove, as shown in red. The request for this change is contained in inclosed letter of April 13, 1900, from the Rockland-Rockport Lime Company. Soundings with an iron rod at intervals of 100 feet along the suggested new line, and between it and the present harbor line, indicate an absence of ledge within the area that would have to be dredged. I respectfully recommend approval of the desired change, as indicated on the tracing.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, April 26, 1900.

Respectfully forwarded to the Chief of Engineers; recommended for approval so far as relates to change of harbor lines on north side of Crocketts Point and in cove around Ledge No. 2.

Regarding the proposed line from Perry's wharf to Gregory's wharf, there is no evidence that the riparian owners unanimously desire a change in the harbor line along their front. Some of the intervening piers are very short, and it may be that the owners may later desire to extend them beyond the proposed new line to provide necessary berths for their vessels.

If the riparian owners prefer short piers and deeper approaches to longer and more costly piers affording greater capacity for berthing vessels, the modification of the district officer is recommended for approval.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY.
May 1, 1900.

Respectfully returned to Major Roessler, whose attention is invited to the foregoing indorsement of the division engineer.

It is desired that the wishes of all the riparian owners regarding the proposed line from Perry's wharf to Gregory's wharf be ascertained and reported to this office.

To be returned through the division engineer.

A. MACKENZIE,
Acting Chief of Engineers.

[Third indorsement.]

U. S. ENGINEER OFFICE,
Portland, Me., May 9, 1900.

Respectfully returned to the Chief of Engineers, United States Army.

All of the riparian owners behind the proposed harbor line from Perry Brothers' wharf north have been consulted, and agree to the proposed change. The owners of the most northerly wharf—A. J. Bird & Co.—in letter, a copy of which is herewith, would like the line north of Gregory's wharf to swing inshore still farther so as to come nearer their wharf.

Farrand, Spear & Co., in letter herewith, desire a change so as to bring the line nearer their wharf. No soundings with iron rod have been made along the lines indicated in the letters of A. J. Bird & Co., and Farrand, Spear & Co.

S. W. ROESSLER,
Major, Corps of Engineers.

(Through the Division Engineer.)

[Fourth indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, May 10, 1900.

Respectfully returned to the Chief of Engineers.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Fifth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
May 14, 1900.

Respectfully submitted to the Secretary of War.

The presence of ledge in the harbor of Rockland, Me., makes it desirable that the harbor lines at the north end of Crocketts Point and at the head of the cove just west of Crocketts Point be modified, and it is deemed best for the commercial interests that the line from Perry's wharf extending northeast beyond Bird's wharf be moved shoreward.

These changes, which are believed to be acceptable to all excepting one of the riparian owners, are indicated in red on the accompanying tracing.[1] The reasons for the modifications proposed are clearly set forth in the within report of Maj. S. W. Roessler, Corps of Engineers, and the Division Engineer, Colonel Gillespie, agrees with him as to the advisability of the change of harbor line mentioned.

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[1] Not printed.

Concurring in the views of these officers, I recommend that the modifications shown in red on the accompanying tracing be approved, and that the Secretary place his approval upon this paper and upon the accompanying tracing, which has been prepared for his signature.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Sixth indorsement.]

WAR DEPARTMENT,
May 17, 1900.

Approved as recommended by the Chief of Engineers.

ELIHU ROOT,
Secretary of War.

APPENDIX B.

IMPROVEMENT OF RIVERS AND HARBORS IN MAINE SOUTH OF PORTLAND HARBOR; IN NEW HAMPSHIRE, AND IN MASSACHUSETTS NORTH OF LYNN HARBOR.

REPORT OF MAJOR W. L. FISK, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Saco River, Maine.
2. Cape Porpoise Harbor, Maine.
3. Cocheco River, New Hampshire.
4. Exeter River, New Hampshire.
5. Little Harbor, New Hampshire.
6. Newburyport Harbor, Massachusetts.
7. Merrimac River, Massachusetts.
8. Powow River, Massachusetts.
9. Essex River, Massachusetts.
10. Harbor of refuge at Sandy Bay, Cape Ann, Massachusetts.
11. Gloucester Harbor, Massachusetts.
12. Manchester Harbor, Massachusetts.
13. Sea wall at Marblehead, Massachusetts.
14. Removing sunken vessels or craft obstructing or endangering navigation,

EXAMINATIONS AND SURVEYS.

15. Pull-and-be-damned Point, Portsmouth Harbor, New Hampshire.
16. Isle of Shoals, Maine and New Hampshire.
17. Piers and breakwater at Rockport, Massachusetts.
18. Beverly Harbor, Massachusetts.
19. Harbor of refuge, Sandy Bay, Cape Ann, Massachusetts.

UNITED STATES ENGINEER OFFICE,
Portsmouth, N. H., July 18, 1900.

GENERAL: I have the honor to transmit herewith annual report upon the works of river and harbor improvement in my charge for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

W. L. FISK,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

B 1.

IMPROVEMENT OF SACO RIVER, MAINE.

[This work was in the charge of Maj. S. W. Roessler, Corps of Engineers, until September 30, 1899.]

The approved project and the report of progress of the work to June 30, 1899, will be found in the report of the Chief of Engineers for 1900, Part I, page 64.

The operations during the past fiscal year consisted in repairing the south jetty by raising several low places where it had settled, and in constructing a beacon at its outer end. The work was commenced in June, 1900, under contract with George Willett Andrews, and at the close of the year 957 tons of stone had been placed in the jetty.

An examination of the river made in 1896 showed that the 6-foot channel had developed under the combined influence of the breakwater and jetty, but an examination just made shows that at the present time there is but 3½ feet of water at mean low tide on the bar just outside the breakwater and jetty.

In order to maintain the desired depth the breakwater on the north side should be extended to Sharps Ledge, as contemplated in the plan presented to Congress in 1883, in order to stop the influx of sand from that side, the 6-foot channel having evidently been filled by the extension of the north spit southward past the end of the breakwater. It is possible the jetty on the south side may require some extension, but present circumstances do not indicate it.

The following estimate for work, considered at the present time necessary for completing this improvement, is submitted:

Extension of breakwater to Sharps Ledge, 175,000 tons of stone, at $1	$175,000
Repair of shore end of breakwater, 4,000 tons of stone, at $1.25	5,000
Repairing piers, resheathing, etc	1,000
Contingencies	19,000
Total	200,000

Saco is situated in the collection district of Saco, Me., of which Saco is the port of entry. The nearest light-house is Wood Island Light.

Money statement.

July 1, 1899, balance unexpended		$8,338.57
June 30, 1900, amount expended during fiscal year		160.99
July 1, 1900, balance unexpended		8,177.58
July 1, 1900, outstanding liabilities	$1,414.84	
July 1, 1900, amount covered by uncompleted contracts	813.91	
		2,228.75
July 1, 1900, balance available		5,948.83
Amount (estimated) required for completion of existing project		200,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		70,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

March 2, 1827, for piers, buoys, and removing obstructions at and near entrance	$7,000
June 23, 1866, for repairing piers	40,000
March 2, 1867, for improving river	40,000
July 25, 1868, for improving river	20,000
April 10, 1869, for improving river	22,275
July 11, 1870, for improving river	10,000
March 3, 1871, for improving river	15,000
June 10, 1872, for improving river	15,000
July 5, 1884, for breakwater	15,000
August 5, 1886, for breakwater	12,500
August 5, 1886, for improving river	12,500
August 11, 1888, for breakwater	12,500
August 11, 1888, for improving river	10,000

APPOPRIATIONS—continued.

September 19, 1890, for improving river, including breakwater and jetty	$65,000
July 13, 1892, for improving river, including breakwater	25,000
August 18, 1894, for improving river, including breakwater	10,000
June 3, 1896, for improving river, including breakwater	10,000
March 3, 1899	5,000
Total	346,775

Abstract of proposals for repairing jetty at mouth of Saco River, Maine, opened March 14, 1900.

No.	Name and address of bidder.	Price bid per ton of 2,000 pounds of stone placed in the work.	Commence.	Complete.
			1900.	1900.
a1	George Willett Andrews, Biddeford, Me	$1.37	June 1	Aug. 1
2	William S. White, Rockland, Me	1.58	....do...	Nov. 1
3	F. Scripture, Rockport, Mass	1.64	....do...	Sept. 1
4	Sylvester I. Hill, Chebeague Isle, Maine	1.37	....do...	July 30

a Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price per ton of 2,000 pounds of stone placed in the work.	Approved.	Commence.	Complete.
George Willett Andrews, Biddeford, Me.	Apr. 18, 1900	$1.37	Apr. 28, 1900	Within 30 days after notice of approval of contract.	Within 60 days after date of commencement.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
1891	49,765
1892	47,108
1893	59,765
1894	47,350
1895	62,129
1896	46,956
1897	42,214
1898	44,508
1899:	
Brick	3,200
Coal	42,162
Iron	680
Molding sand	375
Gravel	180
Total	46,597

Arrivals and departures in calendar year 1899.

Sailing vessels drawing from 8 to 13½ feet:	
Coastwise	124
Foreign	10

B 2.

IMPROVEMENT OF HARBOR AT CAPE PORPOISE, MAINE.

[This work was in the charge of Maj. S. W. Roessler, Corps of Engineers, until September 30, 1899.]

The harbor at Cape Porpoise is situated about midway between Portland, Me., and Portsmouth, N. H.

Originally the harbor had a depth of about 13 feet at mean low tide, but for a small area only, and the entrance was obstructed by a bar on which there was only about 10 feet of water at mean low tide. The anchorage was too small to accommodate the small vessels seeking that place for refuge, without regard to the commerce of the place.

By act of March 3, 1899, Congress adopted a project for securing a channel of entrance 200 feet wide and 16 feet deep at mean low tide and a channel and anchorage within the harbor about 3,000 feet long, 600 feet wide, and 15 feet deep at mean low tide, at an estimated cost of $125,000, and at the same time placed the work under the continuous-contract system.

There were no expenditures up to June 30, 1899. In October, 1899, contract was entered into with George F. Taylor for doing the entire work, estimated at 717,000 cubic yards, at 9.2 cents per cubic yard. Work under the contract was commenced early in June, 1900, and at the close of that month 45,878 cubic yards of material had been excavated. Dredging began at the entrance to the harbor, and on June 30, 1900, about one-half the length of the entrance had been completed to full projected width and depth and about 10,000 square feet of the anchorage basin had been dredged to the required depth, except over a small area at the entrance, where ledge was found.

Owing to the low price at which the contract for this work was let, it is expected that the total cost of the improvement will be reduced about $45,000 below the original estimate of $125,000. Seventy thousand dollars was appropriated by the act of March 3, 1899, and the additional sum of $10,000 needed to complete the improvement was appropriated by the sundry civil act of June 6, 1900.

The harbor in its present condition has been much used as a harbor of refuge by small vessels in bad weather, and it is expected that within a few months it will be available for vessels up to 15-feet draft.

This work is located in the collection district of Kennebunk, Me., of which Kennebunk is the port of entry. The nearest light-house is on Goat Island, at the entrance to the harbor.

Money statement.

July 1, 1899, balance unexpended		$70,000.00
Amount appropriated by sundry civil act approved June 6, 1900		10,000.00
		80,000.00
June 30, 1900, amount expended during fiscal year		505.46
July 1, 1900, balance unexpended		79,494.54
July 1, 1900, outstanding liabilities	$4,421.03	
July 1, 1900, amount covered by uncompleted contracts	61,743.22	
		66,164.25
July 1, 1900, balance available		13,330.29

APPROPRIATIONS.

March 3, 1899	$70,000
June 6, 1900	10,000
Total	80,000

Abstract of proposals for dredging harbor at Cape Porpoise, Maine, opened September 18, 1899.

No.	Name and address of bidder.	Estimated quantity, 717,000 cubic yards.		Commence—	Complete—
		Per cubic yard for dredging, scow measurement.	Amount.		
		Cents.			
[a]1	George F. Taylor, New York, N. Y	$9\frac{2}{10}$	$65,964	May 15, 1900	Nov. 15, 1900
2	Simon J. Donovan, Winthrop, Mass	14	100,380	Apr. 1, 1900	Dec. 1, 1900
3	Alonzo E. Smith, New York, N. Y	$13\frac{9}{10}$	99,668	Oct. 15, 1899	Do.
4	Augustus R. Wright, Portland, Me	$13\frac{1}{2}$	96,795	Apr. 1, 1900	Dec. 31, 1901

[a] Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price per cubic yard for dredging, scow measurement.	Approved.	Commence—	Complete—
		Cents.			
George F. Taylor, New York, N. Y.	Oct. 24, 1899	$9\frac{2}{10}$	Nov. 11, 1899	May 15, 1900	Nov. 15, 1900

COMMERCIAL STATISTICS.

The harbor up to the present time has been used principally as a harbor of refuge for fishermen, but an electric road 22 miles long has been built from Cape Porpoise to the manufacturing town of Sanford, Me., and an official of the road has informed me that when the dredging is completed it is expected that a line of steamers will be put on between Cape Porpoise and Boston, and perhaps Portland. He further stated that it is proposed to bring all the coal used in Sanford and all raw material for the mills into this port.

It has been impracticable to obtain any commercial statistics since 1898, when the following items were reported:

	Tons.
Coal	20,000
Fish	350

B 3.

IMPROVEMENT OF COCHECO RIVER, NEW HAMPSHIRE

[This work was in the charge of Maj. S. W. Roessler, Corps of Engineers, until September 30, 1899.]

The approved project and the report of progress of the work to June 30, 1899, may be found in the Report of the Chief of Engineers for 1900, Part I, page 66.

The expenditures during the fiscal year 1900 were $19,079.94. Operations began at Clement's wharf, where the last dredging terminated, and consisted in deepening the channel, continuing the dredging down river from that point a distance of 2,200 feet. The work was done under contract with Augustus B. Martin and was completed in December, 1899, when a total of 19,904.9 cubic yards of material had been removed.

This work is located in the collection district of Portsmouth, N. H., of which Portsmouth is the port of entry. The nearest light-house is Portsmouth Light, at the entrance to Portsmouth Harbor.

Money statement.

July 1, 1899, balance unexpended	$25,155.46
June 30, 1900, amount expended during fiscal year	19,079.94
July 1, 1900, balance unexpended	6,075.52
Amount (estimated) required for completion of existing project	85,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	45,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

July 4, 1836	$5,000	July 5, 1884	$28,000
March 3, 1837	5,000	August 5, 1886	10,000
March 3, 1871	10,000	August 11, 1888	9,000
June 10, 1872	10,000	September 19, 1890	25,000
March 3, 1873	10,000	July 13, 1892	15,000
June 23, 1874	10,000	August 18, 1894	15,000
March 3, 1875	25,000	June 3, 1896	15,000
August 14, 1876	14,000	March 3, 1899	20,000
June 18, 1878	6,000		
August 2, 1882	28,000	Total	260,000

Abstract of proposals for dredging in Cocheco River, New Hampshire, opened August 2, 1899.

No.	Name and address of bidder.	Price per cubic yard.	Commence—	Complete—
1	Augustus R. Wright, Portland, Me	$1.00	Oct. 1, 1899	Nov. 30, 1900
2	Alonzo E. Smith, New York, N. Y	1.45	Apr. 1, 1900	Dec. 1, 1900
a3	Augustus B. Martin, Boston, Mass	.90	Oct. 1, 1899	July 1, 1900

a Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price per cubic yard for dredging.	Approved.	Commence—	Complete—
		Cents.			
Augustus B. Martin, Boston, Mass.	Aug. 12, 1899	90	Sept. 1, 1899	Oct. 1, 1899	July 1, 1900

COMMERCIAL STATISTICS.

Receipts [illegible]

	Tons.		Tons.
1891	70,662	1895	83,151
1892	71,785	1896	54,755
1893	66,953	1898	131,065
1894	68,415		

1899:	
Coal	35,000
Bricks	25,000
Lumber	37,000
Cement, lime, and plaster	45,000
Phosphate	250
Sand (molding)	200
Wood	1,500
Ashes	50
Potatoes	25
Apples	15
	144,040

Arrivals and departures in calendar year 1899.

Vessels arriving	47
Tugs with barges	150

B 4.

IMPROVEMENT OF EXETER RIVER, NEW HAMPSHIRE.

[This work was in the charge of Maj. S. W. Roessler, Corps of Engineers, until September 30, 1899.]

A survey of this river was made in 1874 from its mouth in Great Bay up to the wharves at Exeter, a distance of 8.3 miles, and a project was submitted to obtain a towing channel with a minimum width of 40 feet and a minimum depth from the mouth to Oxbow (5.6 miles) of 12 feet at high tide, and from Oxbow up to Exeter of 10 feet, and to remove the bowlders all the way up between the 10-foot contours down to a depth of 10 feet below high tide, at an estimated cost of $34,000. The improvement was completed in 1882 at a cost of $35,000.

Under the requirements of the river and harbor act of June 3, 1896, a new survey was made from the mouth of the river to the upper bridge at Exeter, N. H., and a report submitted containing a project for a towing channel 40 feet wide, 12 feet deep at mean high tide up to Oxbow, and 11 feet deep at mean high tide from thence up to Exeter, the estimate of cost being $12,000. By the act of March 3, 1899, this project was adopted, and the entire amount of the estimate appropriated.

There were no expenditures during the fiscal year 1899.

Operations under the appropriation of $12,000, made by the act of March 3, 1899, were begun in May, 1900, at the head of navigation in Exeter, under contract with Augustus B. Martin, and at the close of the fiscal year 8,370 cubic yards of material had been excavated, completing the channel to the projected width and depth for a distance of 800 feet down river.

As the work has progressed it is found that the actual amount of excavation to be done is much more than the original estimate, the present depth of water being considerably less in places than is shown by the survey made in 1896, upon which the estimate of the present project is based. More of this filling in is found in the upper part of the channel than below and is partly due to deposits from sewage which empties into the river at Exeter.

The following estimate of the amount required to complete the present project for this improvement is submitted:

8,000 cubic yards dredging, at 75 cents	$6,000
Contingencies	1,000
Total	7,000

This work is located in the collection district of Portsmouth, N. H., of which Portsmouth is the port of entry. The nearest light-house is Portsmouth Light, at the entrance to Portsmouth Harbor.

Money statement.

July 1, 1899, balance unexpended		$12,000.00
June 30, 1900, amount expended during fiscal year		1,248.79
July 1, 1900, balance unexpended		10,751.21
July 1, 1900, outstanding liabilities	$4,384.56	
July 1, 1900, amount covered by uncompleted contracts	5,960.44	
		10,345.00
July 1, 1900, balance available		406.21
Amount (estimated) required for completion of existing project		7,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		7,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

June 14, 1880	$20,000
March 3, 1881	15,000
March 3, 1899	12,000
Total	47,000

Abstract of proposals for dredging and removing bowlders in Exeter River, New Hampshire, opened March 14, 1900.

No.	Name and address of bidder.	Price bid— Per cubic yard, for dredging, scow measurement.	Price bid— Per ton, for removing bowlders greater than 3 tons in weight.	Commence.	Complete.
		Cents.			
a1	Augustus B. Martin, Boston, Mass	54	$10	June 1, 1900	Oct. 1, 1900
2	Simon J. Donovan, Winthrop, Mass	57	12	May 1, 1900	Dec. 31, 1900

a Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price—		Approved.	Commence.	Complete.
		Per cubic yard, for dredging, scow measurement.	Per ton, for removing bowlders greater than 3 tons in weight.			
Augustus B. Martin, Boston, Mass.	Mar. 26, 1900	*Cents.* 54	$10	Apr. 18, 1900	Within ten days after notice of approval of contract.	Within seven months from date of commencement.

COMMERCIAL STATISTICS.

Receipts and shipments.

		Tons.
1896		10,166
1899:		
Coal	9,950	
Fish (in pickle)	135	
Wood, cords	835	
		10,920

Arrivals and departures.

Schooners	28
Lighters	61

The schooners were of about 200 tons capacity and 8½ to 9 feet draft. For river freighting, gondolas of an average capacity of 75 tons on 5 feet draft are employed. One sailing gondola and, at times, four towed boats of the latter description ply on the river.

B 5.

HARBOR OF REFUGE AT LITTLE HARBOR, NEW HAMPSHIRE.

[This work was in the charge of Maj. S. W. Roessler, Corps of Engineers, until September 30, 1899.]

The approved project and the report of progress of the work to June 30, 1899, will be found in the Report of the Chief of Engineers for 1900, Part I, page 68.

The expenditures during the fiscal year 1900 were $706.37. Under the appropriation of $12,000 made by the act of March 3, 1899, dredging operations were commenced May 31, 1900, under contract with Charles H. Souther, and consisted in widening the anchorage area on the southern side, where it is about 2,000 feet in length. At the close of the fiscal year 25,735.6 cubic yards of material had been excavated, resulting in widening the anchorage area 50 feet to full depth.

This work is located in the collection district of Portsmouth, N. H., of which Portsmouth is the port of entry. The nearest light-house is Whale Back Light, Portsmouth Harbor, New Hampshire.

Money statement.

July 1, 1899, balance unexpended		$12,071.94
June 30, 1900, amount expended during fiscal year		706.37
July 1, 1900, balance unexpended		11,365.57
July 1, 1900, outstanding liabilities	$4,651.99	
July 1, 1900, amount covered by uncompleted contracts	6,157.11	
		10,809.10
July 1, 1900, balance available		556.47
Amount (estimated) required for completion of existing project		13,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		13,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

August 5, 1886	$10,000
August 11, 1888	20,000
September 19, 1890	40,000
July 13, 1892	30,000
August 18, 1894	10,000
June 3, 1896	$10,000
March 3, 1899	12,000
Total	132,000

Abstract of proposals for dredging in Little Harbor, New Hampshire, opened March 14, 1900.

No.	Name and address of bidder.	Price bid per cubic yard, scow measurement.	Total number of yards that can be removed.	Commence.	Complete.
		Cents.			
1	Simon J. Donovan, Winthrop, Mass	24	45,000	May 1, 1900	Dec. 31, 1900
a 2	Chas. H. Souther, Boston, Mass.	$16\frac{7}{8}$	64,000	June 1, 1900	Oct. 30, 1900
3	Eastern Dredging Co., Boston, Mass	$17\frac{3}{4}$	60,845	July 1, 1900	Nov. 15, 1900
4	Harries & Letteney, Boston, Mass	$17\frac{7}{10}$	61,016	May 1, 1900	Aug. 1, 1900

a Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price per cubic yard, scow measurement.	Approved.	Commence.	Complete.
		Cents.			
Chas. H. Souther, Boston, Mass.	Mar. 28, 1900	$16\frac{7}{8}$	Apr. 5, 1900	Within 45 days after notice of approval of contract.	Within 5 months from date of commencement.

COMMERCIAL STATISTICS.

The prospective benefits to commerce and navigation by the construction of this harbor of refuge are, primarily, increased safety to life and property, there being neither imports nor exports. During the calendar year 1899 the harbor was frequented by about 150 vessels, 30 per cent of which were fishing and coastwise craft, and the remainder sailing and steam yachts.

The following is an extract from statistics submitted by the superintendent of the First life-saving district:

"To give value of tonnage would be guess work, as the difference in value of a 'floating palace' steam yacht and that of an old-time coaster is so great that nothing near a correct approximate value can be given. This harbor can be made one of the finest snug harbors of refuge on the coast, and the good work of improvement should continue."

B 6.

IMPROVEMENT OF NEWBURYPORT HARBOR, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

Newburyport, Mass., is situated about 2½ miles from the Atlantic Ocean, on the south bank of the Merrimac River.

The river empties into the Atlantic Ocean midway between Cape Ann and Portsmouth, or about 30 miles a little east of north from Boston in a direct line.

The outlet of the river between Plum Island and Salisbury Point is 1,000 feet wide and 30 feet deep at mean low water. At a distance of nearly a mile outside lies a sandy bar, thrown up by wave action, through which, previous to the improvement, a channel, variable in position and depth, was maintained by the current of the river, increased by the tidal flow in a large interior basin through a mean range of tides of 7.7 feet.

For 1,000 feet outward from the gorge toward the crest of the bar the current was able to maintain a channel of navigable width and 18 feet deep at mean low water, and for a farther distance of 1,500 feet a channel 12 feet deep. From the 18-foot contour line on the inside to the same on the outside the distance was 4,000 feet, and between the 12-foot contours the distance was 3,000 feet.

The depth on the crest of the bar was generally less than 7 feet at mean low water.

The object of the improvement is to create through the outer bar a channel 1,000 feet wide and at least 17 feet deep at mean low water, so that vessels with as great draft as can reach Newburyport by the river at high tide may cross the bar and find a harbor at any stage of the tide.

The project submitted September 18, 1880, proposed two converging rubblestone jetties and the protection of the beach in their vicinity. The converging portion of the north jetty was to be about 2,900 feet long; of the south jetty, about 1,500 feet. The outer ends of the jetties were to be about 1,000 feet apart and to be extended parallel to the axis of the channel if found necessary.

The original estimate of cost of this project for shore protection and the converging portions of the jetties was $240,000, but was increased in 1881 to $365,000.

The project was modified in 1882 so as to provide for the partial closing of Plum Island Basin with a timber dike about 800 feet long and 5¼ feet above mean low water. The location and details of construction of the dike are given in the report of 1883.

The direction of the south jetty and the character of the shore protection was modified in 1883.

In 1897 the estimate of cost of the jetties was revised and increased by $224,547.49, to provide for the construction of the parallel portions. (Annual Report 1897, p. 825.)

Both jetties are 15 feet wide on top, which is in a plane 12 feet above mean low water, and have slopes of 1 on 2 on the sea side and 1 on 1 on the shore side.

A map showing the location of the jetties is published in the Annual Report of the Chief of Engineers for 1885.

The total amount appropriated for this work to date is $338,500, $3,000 of which may, in the discretion of the Secretary of War, be expended in removing "North Rock" from the harbor.

The total expenditures to June 30, 1899, were $312,162.62. No operations having been in progress the condition of the improvement was then the same as on June 30, 1898, when the north and south jetties were completed to full cross section for 2,705 feet and 1,790 feet, respectively, and the shore end of the latter was strengthened by a sand catch; the north jetty had, however, been somewhat damaged in places by storms. The dike was completed except near its center, where a weir 150 feet long with its sill 2 feet above mean low water had been left temporarily.

Under the appropriation for this work made by the act of March 3, 1899, the south jetty was extended in full cross section a distance of 260 feet, and the north jetty, which had been torn down in places by storms, was repaired. This work was done under contract with the Rockport, Pigeon Hill, and Cape Ann Granite companies, a total of 16,997 tons of stone being placed in the work, 540 tons of which were used in repairing the north jetty. The contract was satisfactorily completed in the latter part of June, 1900.

A survey of the bar which was in progress at the time the last annual report was submitted was completed soon thereafter and showed a single channel with a least depth on the bar of 11 feet at low water, about the same as the year before, but with a single straight channel about midway between the two old ones. The pilots report better water than ever before.

Nothing has yet been done toward the removal of "North Rock," but a survey of it will soon be made to obtain the necessary data for preparing specifications for the work.

The advantage to be derived from the completion of the project is the deepening and widening of the channel across the bar, thereby affording a harbor of refuge on the inside of Salisbury Beach and giving easy access at high tide to the wharves at Newburyport for vessels drawing 17 feet, approximately.

This work is located in the collection district of Newburyport, Mass., of which Newburyport is the port of entry. The nearest light-house is on Plum Island, at entrance of harbor.

Money statement.

July 1, 1899, balance unexpended	$26,337.38
June 30, 1900, amount expended during fiscal year	16,616.46
July 1, 1900, balance unexpended	9,720.92
July 1, 1900, outstanding liabilities	5,923.83
July 1, 1900, balance available	3,797.09
Amount (estimated) required for completion of existing project	264,047.49
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	264,047.49
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Act of—	
June 14, 1880	$50,000
March 3, 1881	40,000
August 2, 1882	40,000
July 5, 1884	40,000
August 5, 1886	37,500
August 11, 1888	25,000
September 19, 1890	25,000
July 13, 1892	$20,000
August 18, 1894	20,000
June 3, 1896	16,000
March 3, 1899	25,000
Total	338,500

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price per ton of 2,000 pounds.	Approved.	Commence.	Complete.
Rockport, Pigeon Hill and Cape Ann Granite Cos., Rockport, Mass.	July 7, 1899	$1.09	July 19, 1899	Within 5 days after notice of approval.	June 30, 1900

Contract completed.

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
Coal	180,000
Lumber	300
Iron rails	300

During the calendar year 1899 there were 182 arrivals of vessels; total tonnage, 141,000; value, $3,500,000. The vessels are barges and three-masted schooners, with a draft of water ranging from 10 to 14 feet. The barges average 900 tons and the schooners 500 tons. The establishment of a new line of transportation is contemplated. During the year one steamer of 150 tons was built and a schooner of about 900 tons was in process of construction.

B 7.

IMPROVEMENT OF MERRIMAC RIVER, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

The mouth of the Merrimac River is 15 miles northwest from Cape Ann, Massachusetts. Tide water extends up it a distance of 21½ miles, or to the foot of the Upper Falls, 1½ miles above Haverhill, Mass.

Seven incorporated cities and the largest mills in New England are directly interested in this improvement.

Before improvement the channel was narrow and crooked and much obstructed by ledges, bowlders, and shoals.

The river has been improved under numerous projects since 1828, and in its present condition the channel has the following depths at ordinary high-water stages of the river: From the mouth to Deer Island Bridge, 5 miles, 16½ feet; thence to Haverhill Bridge, 12½ miles, 12 feet; thence to the foot of Mitchells Falls, Hazeltine Rapids, 1½ miles, 10 feet; thence through Mitchells Falls to the head of the Upper

Falls, 2½ miles, not less than 4½ feet when the mill water at Lawrence is running.

The rise or fall of the tide at the mouth is 7.7 feet; at Haverhill Bridge, 4.62 feet.

The present approved project was submitted on May 5, 1897, and proposes to obtain a continuous depth of 7 feet at mean low water in a channel 150 feet wide from Newburyport to Haverhill. The estimated cost of this project is $171,442.70. The project is published in Annual Report Chief of Engineers, 1897, page 865.

The total appropriations to date have been $287,366.72.

The expenditures to June 30, 1899, were $247.248.07.

The river and harbor act of March 3, 1899, appropriated $40,000 for improvement of the river under the project of May 5, 1897. On June 28, 1899, a project was submitted for the expenditure of this appropriation in dredging the channel to full proposed width and depth from Haverhill for as great a distance down the river as the funds would admit of.

After due advertisement contract was entered into September 21, 1899, with Alonzo E. Smith, of New York City, the work to commence in the spring of 1900, after the subsidence of the annual freshet in the river. Owing to the failure of the contractor to commence the dredging as required, the contract was annulled May 29, 1900, and the work is now about to be readvertised.

No other operations have been in progress during the fiscal year, and the work is in the same condition as on June 30, 1899.

This work is located in the collection district of Newburyport, Mass., of which Newburyport is the nearest port of entry. The nearest light-houses are the Plum Island lights and the Newburyport Upper Harbor lights.

Money statement.

July 1, 1899, balance unexpended	$40,118.65
June 30, 1900, amount expended during fiscal year	37.04
July 1, 1900, balance unexpended	40,081.61
Amount (estimated) required for completion of existing project	131,442.70
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	50,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Act of—		Act of—	
May 23, 1828	$32,100.00	March 3, 1879	$5,000.00
April 2, 1830	3,506.72	June 14, 1880	12,000.00
March 2, 1831	16,000.00	March 3, 1881	9,000.00
March 2, 1833	4,900.00	August 2, 1882	9,000.00
June 28, 1834	3,860.00	July 5, 1884	3,500.00
July 11, 1870	25,000.00	September 19, 1890	10,000.00
March 3, 1871	25,000.00	July 13, 1892	1,500.00
June 10, 1872	25,000.00	June 3, 1896	5,000.00
March 3, 1873	25,000.00	March 3, 1899	40,000.00
June 23, 1874	10,000.00		
March 3, 1875	12,000.00	Total	287,366.72
June 18, 1878	10,000.00		

Abstract of proposals for dredging and removing bowlders in Merrimac River, Massachusetts, opened August 26, 1899.

No.	Name and address of bidder.	Price bid per cubic yard.		Total number of cubic yards that can be removed.
		For dredging, scow measurement.	For removing bowlders over 3 tons in weight.	
a 1	Alonzo E. Smith, New York, N. Y	$0.495	$10.00	72,727
2	Eastern Dredging Co., Boston, Mass	.78	5.00	46,153
3	Augustus B. Martin, Boston, Mass	.87	5.00	41,379

a Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price.		Approved.	Commence.	Complete.
		Per cubic yard for dredging, scow measurement.	Per cubic yard for removing bowlders over 3 tons in weight.			
Alonzo E. Smith, New York, N. Y.	Sept. 21, 1899	$0.495	$10.00	Oct. 9, 1899	Within 3 weeks after notice of approval.	Oct. 31, 1900

Contract annulled May 29, 1900.

COMMERCIAL STATISTICS.

The commerce involved in this improvement consists of supplies of coal, lumber, etc., for the cities and towns along its banks, the amount of coal reported in 1899 being 52,000 tons.

Character of vessels plying the river, draft of water, etc.: Scows with an average tonnage of 150, 6 feet draft; schooners with an average tonnage of 200, 8½ feet draft. During the year a steam lighter of 200 tons was built.

B 8.

IMPROVEMENT OF POWOW RIVER, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

Powow River is a tributary of the Merrimac River, which it enters from the north about 3½ miles above Newburyport. From its mouth tide water extends 9,600 feet in a narrow crooked channel, not navigable at low water. The mean rise or fall of tide is 6.7 feet.

The plan for improvement submitted January 24, 1885, proposed to dredge a channel 9,600 feet long, 60 feet wide, and 12 feet deep at mean high water, at an estimated cost of $77,000. The estimate was revised on March 24, 1897, and increased to $100,000. (Annual Report, 1897, p. 829.)

The total appropriations to date have been $51,000.

The expenditures to June 30, 1899, were $38,982.32. At that date the projected 9,600-foot channel was 12 feet deep at mean high water, 45 feet wide for 2,934 feet from its upper end, and at least 30 feet wide for the remaining distance down river. In addition to the above the channel had been dredged 45 feet wide and 12 feet deep at mean high water for a distance of 318 feet above the upper limit of the 9,600-foot channel.

During the past fiscal year work has been in progress under the appropriation of $12,000 made by the act of March 3, 1899. Dredging was begun in August, 1899, under contract with Alonzo E. Smith, of New York City, and continued slowly until March 2, 1900, when operations ceased entirely, with the contract but little more than half completed. Owing to the failure of the contractor to continue the work the contract was annulled April 28, 1900. Negotiations were entered into with the various dredging companies in this section of country and the work is now being completed under open market agreement at the contract price.

On June 30, 1900, 18,099 cubic yards of material had been excavated, extending the 45-foot width of channel for a distance of 3,490 feet down river.

This work is located in the collection district of Newburyport, Mass., of which Newburyport is the nearest port of entry. The nearest light-houses are the Newburyport Upper Harbor lights.

Money statement.

July 1, 1899, balance unexpended	$12,017.68
June 30, 1900, amount expended during fiscal year	7,561.92
July 1, 1900, balance unexpended	4,455.76
July 1, 1900, outstanding liabilities	294.97
July 1, 1900, balance available	4,160.79
Amount (estimated) required for completion of existing project	49,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	49,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

August 11, 1888	$3,000	June 3, 1896	$12,000
September 19, 1890	5,000	March 3, 1899	12,000
July 13, 1892	4,000		
August 18, 1894	15,000	Total	51,000

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Amount bid.		Approved.	Commence.	Complete.
		Per cubic yard for dredging.	Per cubic yard for removing bowlders over 3 tons in weight.			
Alonzo E. Smith, New York, N. Y.	July 14, 1899	$0.345	$10.00	July 26, 1899	Aug. 20, 1899	June 30, 1900

Contract annulled April 28, 1900.

COMMERCIAL STATISTICS.

The commerce involved in this improvement consists principally of supplies of coal for local consumption, a total of 5,000 tons being reported in 1899.

B 9.

IMPROVEMENT OF ESSEX RIVER, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

Essex River winds between marshy banks for 3½ miles from the head of navigation at the village of Essex to its mouth, which forms a harbor of refuge for light-draft vessels, about 3 miles to the southeastward of the entrance to Ipswich River, Massachusetts. The channel of the river is crooked and obstructed by sand bars and bowlders.

The project for its improvement was submitted May 15, 1891. It proposed to widen and deepen the upper 12,000 feet of the natural channel of the river, so that 4 feet at mean low water could be carried to the head of navigation, just below the railroad bridge, in a channel 60 feet wide, at an estimated cost of $25,000.

On March 23, 1899, this project was so modified as to limit the improvement to that section of the channel below the drawbridge, for the reason that the draw had been closed and the section of channel between that bridge and the railroad bridge was no longer used.

The mean rise or fall of the tide is 8.8 feet.

The total appropriations to date have been $25,000.

The expenditures to June 30, 1899, were $14,723.78. At that date the channel had been dredged to its full projected depth, 60 feet wide for a distance of 4,000 feet below the drawbridge in Essex, and at least 25 feet wide for the remainder of the distance to its lower end.

The river and harbor act of March 3, 1899, appropriated $10,000 to complete the improvement of this river.

The work was advertised in the fiscal year 1899, and the only bid received was rejected as being excessive.

During the past fiscal year the work was readvertised, and again there was but one bidder—Augustus B. Martin—whose price was 43 cents per cubic yard for dredging and $4 per ton for removing bowlders greater than 3 tons in weight, which was considered too high.

The specifications for the work limited the amount to be expended to $4,000, less contingencies, but it was subsequently found upon investigation that this amount would be insufficient to complete the improvement as proposed.

Mr. Martin then submitted a written proposition to do the work for 40 cents per cubic yard for dredging and $4 per ton for removing bowlders greater than 3 tons in weight, provided the amount to be expended be increased to $6,000, and under authority of the Secretary of War, dated April 17, 1900, Mr. Martin's bid was rejected and formal contract entered into with him for completing the work at the last-named prices.

No other operations have been in progress during the fiscal year, and at the date of this report the condition of the improvement is the same as on June 30, 1899.

Essex River is in the collection district of Gloucester, Mass., of which Gloucester is the port of entry. The nearest light-house is Annisquam light, 2 miles east of the mouth of the river.

Money statement.

July 1, 1899, balance unexpended	$10,276.22
June 30, 1900, amount expended during fiscal year	40.00
July 1, 1900, balance unexpended	10,236.22
July 1, 1900, amount covered by uncompleted contracts	6,000.00
July 1, 1900, balance available	4,236.22

APPROPRIATIONS.

Act of—	
July 13, 1892	$5,000
August 18, 1894	5,000
June 3, 1896	5,000
March 3, 1899	10,000
Total	25,000

Abstract of proposals for dredging and removing bowlders in Essex River, Massachusetts, opened March 14, 1900.

Name and address of bidder.	Price bid—		Commence.	Complete.
	Per cubic yard, for dredging, scow measurement.	Per ton, for removing bowlders over 3 tons in weight.		
	Cents.			
Augustus B. Martin, Boston, Mass. [a]	43	$4.00	Aug. 31, 1900	Nov. 1, 1900

[a] Proposal rejected.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price—		Approved.	Commence.	Complete.
		Per cubic yard, for dredging, scow measurement.	Per ton, for removing bowlders over 3 tons in weight.			
	1900.	*Cents.*		1900.		
Augustus B. Martin, Boston, Mass.	Apr. 27	40	$4.00	May 9	Within 100 days after notice of approval of contract.	Within 4 months from date of commencement.

COMMERCIAL STATISTICS.

The principal industry of Essex, and the only one interested in the improvement of the river, is vessel building, but no statistics for the past year could be obtained.

B 10.

IMPROVEMENT OF HARBOR OF REFUGE, SANDY BAY, CAPE ANN, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

Sandy Bay is situated at the northeastern extremity of the promontory of Cape Ann, which forms the northern limit of Massachusetts Bay. Its shore lines form a little less than a right angle, and their directions are nearly north and south and east and west. The rocky island of Straitsmouth forms the eastern extremity of one shore line, and the steep headland of Andrews Point the northern end of the other. Following the line of the proposed breakwater, the bay is 2¾ miles wide by 2 miles deep in area, approximately.

The bay on the land side is perfectly protected by steep, high hills, but it fronts the northeast and is open to the full force of the violent northerly and easterly gales of this coast.

The great seas of the ocean are broken, however, in a degree by the sunken rocky ledges called Averys Ledge, the Dry and Little Salvages, the Flat Ground, and Abners Ledge, which are directly at the mouth of the bay. Inside these entrance ledges the bay is entirely unobstructed and has an average depth of 50 feet at mean low water.

The original project for improvement was submitted in 1884. It proposed a continuous breakwater 9,000 feet long, divided into two branches. One starts at Averys Ledge and runs in a direction a little west of north to Abners Ledge, a distance of 3,600 feet; the other extends 5,420 feet from Abners Ledge in a northwesterly direction, and terminates at the 84-foot contour off Andrews Point.

The substructure was to consist of a mound of rubblestone to a grade of 22 feet below mean low water, 40 feet wide on top, to be surmounted by a masonry wall.

The axis of the proposed breakwater is approximately at the inner edge of the ledges, at the entrance of the bay, and about 1 mile inside the Salvages and Flat Ground, which receive the first shock of easterly storm waves.

The southern entrance to the proposed harbor lies between Straitsmouth Island and Averys Ledge, and is to be 1,800 feet wide and at least 30 feet deep. The northern entrance, near Andrews Point, is 2,700 feet wide and 80 feet deep. They are so located with reference to each other that vessels can enter and leave the harbor with any wind.

The harbor formed by the breakwater covers an anchorage of 1,377 acres, in which the depth exceeds 24 feet at mean low water.

On March 2, 1892, the project was modified by a report of the special board of engineers constituted for that purpose, and proposes to construct the entire breakwater of rubblestone, with the following section: On the sea side, from the bottom to 15 feet below mean low water, a slope of 1 on 1½; thence to mean low water, 1 on 3; thence to 18 feet above mean low water, 1 on 1; the width on the crest 20 feet, and the rear slope 1 on 0.73, to mean low water; thence to the bottom, 1 on 1.

A plan of the bay, showing the proposed breakwater, was published in the Annual Report of the Chief of Engineers for 1892, page 564.

The estimated cost of the improvement is $5,000,000, to which must be added $2,500,000 for buoyage, lighting, and defense of the harbor.

The total appropriations to date have been $1,150,000.

The total expenditures to June 30, 1899, were $896,93 .10. At that date 1,145,292 tons of rubblestone had been placed in the breakwater and its condition was as follows:

Continuing successively from the initial point of the southern arm of the breakwater on Averys Ledge, for a distance of about 240 feet nothing had been done, then about 550 feet was built up to 22 feet below mean low water, about 2,250 feet more to mean low water, and the remainder of the distance to the angle at Abners Ledge, about 500 feet, completed to mean high water. Beginning at this point the western arm was completed for a distance of 2,100 feet to 22 feet below mean low water, 40 feet wide on top.

During the past fiscal year operations have been in progress under the appropriation of $250,000 made by the river and harbor act of March 3, 1899. A project for the expenditure of this appropriation was submitted which proposed to construct 1,000 feet of superstructure and extend the substructure, but the project was approved only as to the extension of the substructure, it being desired to give further study to the plan of superstructure best adapted to this case.

Contract was entered into with the Rockport, Pigeon Hill, and Cape Ann Granite companies September 20, 1899, and up to the close of the fiscal year 57,055 tons of rubblestone had been deposited in the substructure of the southern arm of the breakwater, making a total of 1,202,347 tons of rubblestone placed in the whole work up to June 30, 1900, when the condition of the southern arm was as follows:

Continuing successively from the initial point of the southern arm of the breakwater on Averys Ledge, for a distance of about 240 feet nothing had been done, then about 250 feet was built up to 3 feet below mean low water, about 2,550 feet more to mean low water, and the remainder of the distance to the angle at Abners Ledge, about 500 feet, completed to mean high water.

The act of March 3, 1899, also provided that—

> The Secretary of War shall appoint a board of three engineers, whose duty it shall be to examine said project and report whether any modification of the same should, in their judgment, be made, with an estimate of the cost of completing the same. * * *

The board was appointed March 16, 1899. Its full report was printed as House Doc. No. 453, Fifty-sixth Congress, first session, and is also herewith as Appendix B.

The entire commerce of New England is directly interested in this improvement. Large shipments of stone are made from several little ports in the vicinity of Sandy Bay, and fish and supplies of coal, etc., are received at these ports, the total amounting annually to between 300,000 and 500,000 tons. While this shipping would be benefited by the harbor, these local statistics have no value as measuring the importance of the improvement.

Sandy Bay is situated in the collection district of Gloucester, Mass., of which Gloucester is the port of entry. The nearest light-house is Straitsmouth Light, at the southern entrance of the bay.

Money Statement.

July 1, 1899, balance unexpended		$253,063.90
June 30, 1900, amount expended during fiscal year		31,998.74
July 1, 1900, balance unexpended		221,065.16
July 1, 1900, outstanding liabilities	$9,846.31	
July 1, 1900, amount covered by uncompleted contracts	58,555.35	
		68,401.66
July 1, 1900, balance available		152,663.50
Amount (estimated) required for completion of existing project		3,850,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		500,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Act of—		Act of—	
July 5, 1884	$100,000	August 18, 1894	$150,000
August 5, 1886	100,000	June 3, 1896	150,000
August 11, 1888	100,000	March 3, 1899	250,000
September 19, 1890	150,000		
July 13, 1892	150,000	Total	1,150,000

Abstract of proposals for delivery of rubblestone in breakwater at Sandy Bay, Cape Ann, Massachusetts, opened September 5, 1899.

No.	Name and address of bidder.	Price per ton of 2,000 pounds.	Total number of tons that can be delivered.
		Cents.	
a 1	Rockport, Pigeon Hill, and Cape Ann Granite Cos., Rockport, Mass	63	157,079
2	Edwin Canney, Pigeon Cove, Mass	71	139,380
3	Samuel F. Randolph, New York, N. Y	67½	146,459

a Proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price per ton of 2,000 pounds.	Approved.	Commence.	Complete.
		Cents.			
Rockport, Pigeon Hill, and Cape Ann Granite Cos., Rockport, Mass.	Sept. 20, 1899	63	Oct. 6, 1899	Within 15 days after notice of approval.	June 30, 1901.

B II.

IMPROVEMENT OF HARBOR AT GLOUCESTER, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, September 30, 1899.]

Gloucester Harbor is an important center for the fishing fleet of New England, about 20 miles north of Boston. Its inner harbor was originally obstructed by sunken rocks and shoals, and the approaches to the wharves were shallow, varying from 1 to 12 feet. The outer harbor was open to all southerly gales.

The first project for its improvement was submitted January 20, 1871, and proposed to build a breakwater from Eastern Point to Round Rock Shoal and to clear the harbor of sunken rocks.

The present approved project was submitted in 1887. (Annual Report for 1887, Part I, p. 500.) It proposed to remove from the inner harbor obstructing rocks and shoals, giving in front of the wharves, as far as Pew's wharf, 15 feet depth at low water and 10 feet in Harbor Cove, at an estimated cost of $65,000, and to build a breakwater from Eastern Point to Round Rock Shoal.

On May 5, 1897, a project was submitted for the removal of a pinnacle rock in the outer harbor to a least depth of 16 feet at mean low water, and rocks off the ferry landing at Rocky Neck to the level of the surrounding bottom, at a cost of $2,000. (Annual Report, 1897, p. 835.)

On December 18, 1897, a revised project for the construction of the breakwater was submitted. This project proposed to build the substructure of the breakwater of rubblestone up to mean low water and 31 feet wide at that grade, to be surmounted by a superstructure formed of two dry walls of heavy split stone laid with the greatest dimension at right angles to the axis of the breakwater, the interior space to be filled with rubblestone and to be capped by heavy stone, forming a top course 10 feet in width.

This project was estimated to cost $698,083.43, and was approved January 4, 1898.

The total appropriations to date have been $194,000.

The expenditures to June 30, 1899, were $153,628.52. At that date all dredging and rock removal under the projects of 1887 and May 5, 1897, had been completed, the cost being about $15,000 more than the original estimate ($65,000), and the construction of the breakwater was in progress. Ninety thousand eight hundred tons of rubblestone had been deposited in the breakwater and 1,650 feet of the substructure had been completed to mean low water to the cross section proposed by the project of 1887.

The river and harbor act of March 3, 1899, appropriated $40,000 for continuing the improvement of this harbor, and on June 17, 1899, a project was approved for expenditure of this sum.

Under the above appropriation operations have been in progress during the past fiscal year under contract with the Rockport, Pigeon Hill, and Cape Ann Granite companies, and consisted in widening the entire portion of 1,650 feet of substructure already built to the full cross section proposed by the revised project of January 4, 1898, and in commencing the superstructure, in which 10 tons of dimension stone were placed.

On June 30, 1900, 15,886 tons of rubblestone and 10 tons of dimension stone had been deposited in the breakwater under this contract, making a total of 106,686 tons of rubblestone and 10 tons of dimension stone placed in the work up to that date.

No benefit has resulted from the construction of the breakwater, as no sheltered anchorage has as yet been obtained, but navigation in the harbor has been greatly facilitated by the dredging and ledge removal.

The prospective advantage to commerce by the completion of the improvement is safer anchorage for vessels seeking protection from southerly gales.

Gloucester Harbor is in the collection district of Gloucester, Mass., of which Gloucester is the port of entry. The nearest light-houses are Ten-pound Light in the harbor and Eastern Point Light at its entrance.

Money statement.

July 1, 1899, balance unexpended		$40,371.48
June 30, 1900, amount expended during fiscal year		15,746.21
July 1, 1900, balance unexpended		24,625.27
July 1, 1900, outstanding liabilities	$1,658.06	
July 1, 1900, amount covered by uncompleted contracts	21,823.95	
		23,482.01
July 1, 1900, balance available		1,143.26
Amount (estimated) required for completion of existing project		584,083.43
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		200,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

Act of—		Act of—	
June 10, 1872	$10,000	August 18, 1894	$40,000
August 5, 1886	5,000	June 3, 1896	34,000
August 11, 1888	10,000	March 3, 1899	40,000
September 19, 1890	15,000		
July 13, 1892	40,000	Total	194,000

Abstract of proposals for construction of section of breakwater at Gloucester Harbor, Massachusetts, opened August 29, 1899.

No.	Name and address of bidder.	Price—					
		Per ton of 2,000 pounds for rubblestone in substructure.	Per ton of 2,000 pounds for dimension stone in superstructure.	Per ton of 2,000 pounds for rubblestone in interior of superstructure and in apron.	Per cubic yard for mortar.	Per pound for Norway iron cramps in place.	Approximate total amount.
[a]1	Rockport, Pigeon Hill, and Cape Ann Granite Cos., Rockport, Mass.	$0.89	$3.75	$1.39	$9.50	$0.275	$40,755

[a] Only bid; proposal accepted.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Price—					Entered into.	Approved.	Commence.	Complete.
	Per ton of 2,000 pounds, for rubblestone in substructure.	Per ton of 2,000 pounds, for dimension stone in superstructure.	Per ton of 2,000 pounds, for rubblestone in interior of superstructure and in apron.	Per cubic yard for mortar.	Per pound for Norway iron cramps in place.				
Rockport, Pigeon Hill, and Cape Ann Granite Cos., Rockport, Mass.	$0.89	$3.75	$1.39	$9.50	$0.275	1899. Sept. 20	1899. Oct. 7	Within 30 days after notice of approval.	1900. Oct. 31

COMMERCIAL STATISTICS.

The accompanying commercial statistics have been furnished by the collector of customs at Gloucester, Mass.

Amount of revenue collected.

1896	$1,150
1897	8,000
1898	6,079
1899	7,000

Shipping.

	1896.		1897.		1898.		1899.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Entrances:								
Foreign	107	20,153	104	24,761	107	19,872	149	29,900
Domestic	7	947	10	14,400	28	4,000		
Clearances:								
Foreign	101	17,120	102	25,400	103	10,563	120	13,500
Domestic	24	12,621	45	19,200	31	7,400	22	15,200

Shipments and receipts.

	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Coal	47,200	60,000	70,000
Salt	26,200	23,500	27,600
Lumber	2,200	500	4,500
Fish (fresh and salt)			70,000
Wood			2,122
Merchandise	5,000	1,550	80,000
Miscellaneous	2,000	500	30,000
Hay			200
Ice			2,500
Brick			1,000

All classes of vessels frequent the harbor, and vessels with salt, drawing 23 feet, discharge here. The fishing vessels frequenting the harbor represent about 20,200 tonnage.

During the calendar year 1899 about 4,000 vessels were boarded by the United States revenue officials. About 100,000 passengers were carried to and from Gloucester by steamer. Twenty-five schooners and sloops, of about 100 tons each, and one steamer of 400 tons were built in the vicinity.

B 12.

IMPROVEMENT OF HARBOR AT MANCHESTER, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

Manchester Harbor is situated about 5½ miles northeast from the entrance of Salem Harbor, Massachusetts.

The channel before improvement was 100 feet wide and 6½ feet deep at mean low water up to Proctors Point. It then shoaled rapidly to a a depth of 1½ feet at The Narrows, 1,400 feet from Proctors Point, and for a farther distance of 2,500 feet to the town wharves no low-water channel existed.

A project for its improvement, submitted November 28, 1897, has been completed and the channel from Proctors Point to the town wharves is now 60 feet wide and 4 feet deep at mean low water.

A chart of the harbor was published in the Annual Report of the Chief of Engineers for 1888, Part I, page 466.

The present approved project for improvement of this harbor was adopted March 3, 1899, and proposes to follow the natural channel and to dredge the same to a depth of 6 feet at mean low water for a length of 7,200 feet, and to make it 100 feet wide at the entrance and at the sharp bends, and at least 75 feet wide throughout, with two turning or anchorage basins, one 200 by 300 feet in area, just below the bridge, and the other 125 by 250 feet, near the town landing wharf, at an estimated cost of $25,000. This project was published in the Annual Report for 1897, page 869.

The river and harbor act of March 3, 1899, appropriated $5,000 for improvement of this harbor in accordance with the project submitted July 30, 1897, and under a contract with Augustus B. Martin the channel from the 6-foot contour in the bay up to a point northwest of Proctors Point, a distance of 3,200 feet, was dredged to full projected width and depth, excepting over two small ledges which project into the channel about 20 feet on the eastern side, about west of Proctors Point. This contract was satisfactorily completed in August, 1899, 12,935½ cubic yards of material having been removed. Nothing has been done since that time.

The improvement in its present condition has greatly facilitated the approach of vessels to the town wharves. The commerce involved in this improvement consists of supplies of coal, lumber, etc., for local consumption.

Manchester Harbor is in the collection district of Gloucester, Mass., of which Gloucester is the port of entry. The nearest light-house is on Bakers Island, 2½ miles from Proctors Point.

Money statement.

July 1, 1899, balance unexpended	$5,000.00
June 30, 1900, amount expended during fiscal year	4,747.78
July 1, 1900, balance unexpended	252.22
Amount (estimated) required for completion of existing project	20,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	20,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

August 11, 1888	$2,500
September 19, 1890	5,000
July 13, 1892	6,800
March 3, 1899	5,000
Total	19,300

The first three appropriations were expended in execution of the project of November 28, 1887.

Contract in force during fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price.		Approved.	Commence.	Complete.
		Per cubic yard for dredging.	Per cubic yard for removing bowlders over 3 tons in weight.			
		Cents.				
Augustus B. Martin, Boston, Mass.	July 12, 1899	33½	$5.00	July 26, 1899	Aug. 1, 1899	Oct. 31, 1899

COMMERCIAL STATISTICS.

Receipts and shipments.

	Tons.
Coal	5,400
Lime	500
Lumber	1,500
Granite	2,600
Total	10,000

The draw was opened seventy-six times to admit passage of vessels.

Five yachts were built during the year.

B 13.

REPAIR OF SEA WALL AT MARBLEHEAD, MASSACHUSETTS.

[This work was in the charge of Col. Charles R. Suter, Corps of Engineers, until September 30, 1899.]

Marblehead, Mass., is about 12 miles north of Boston, Mass. A part of the town is situated on Marblehead Neck, a peninsula lying east of the mainland and connected therewith by an isthmus about 2,000 feet long and a least width of 105 feet between high-water lines, which forms the southern bound of Marblehead Harbor.

This isthmus is traversed by a highway which is protected for about 1,900 feet of its length by a sea wall of light construction, reported to have been built by the United States Government in the early part of the present century.

A survey of the isthmus was made in September, 1896, and a report and plan of this survey were submitted to the Department on February 4, 1897, and were published as House Doc. No. 289, Fifty-fourth Congress, second session. The report was also published in the Report of the Chief of Engineers, 1897, Part I, page 870.

The river and harbor act of March 3, 1899, appropriated $1,000 for the repair of the sea wall at Marblehead, made necessary by the great storm of November, 1898.

On June 28, 1899, an allotment of $50 was made from the appropriation of March 3, 1899, to cover the expense of an examination of the sea wall. The examination was made and a report thereon submitted in November, 1899. There is apparently no need of repairs to the sea wall, which seems to have served its purpose all these years without sustaining any damage worth mentioning.

No other operations have been in progress during the fiscal year.

This work is in the collection district of Marblehead, Mass., of which Marblehead is the port of entry. The nearest light-house is Marblehead Light, at the entrance to the harbor.

Money statement.

July 1, 1899, balance unexpended	$1,000.00
June 30, 1900, amount expended during fiscal year	8.33
July 1, 1900, balance unexpended	991.67

B 14.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

The wreck of the schooner *Ellen Maria*, which had been lying about five-eighths of a mile south of the dolphin on White Rock, at the entrance to Lynn Harbor, Mass., since 1893, was removed under the provisions of sections 19 and 20 of the river and harbor act of March 3, 1899.

An allotment of $1,000 for its removal was made August 14, 1899, and after due advertisement contract was entered into with Messrs. Townsend and Olsen, of Boston, Mass., who raised and towed the wreck to sea in November, 1899, sinking it east of a straight line from Egg Rock Light to The Graves whistle buoy, in about 15 fathoms of water.

Abstract of proposals for removing wreck from Lynn Harbor, Mass., opened October 6, 1899.

No.	Name and address of bidder.	Amount bid.
1	Hiram W. Phillips, Quincy, Mass	$1,043
2	International Wrecking, Salvage and Submarine Co., Atlantic City, N. J	675
3	Alfred Sorensen, Boston, Mass	644
[a]4	Townsend & Olsen, Boston, Mass	531
5	Charles W. Johnston, Lewes, Del	590
6	Betts Bros. & Co., Boston, Mass	583

[a] Proposal accepted.

Contract in force during the fiscal year ending June 30, 1900.

Contractor.	Entered into.	Price.	Approved.	Commence.	Complete.
Townsend & Olsen, Boston, Mass.	Oct. 24, 1899	$531	Nov. 9, 1899	5 days after notice of approval of contract.	30 days after notice of approval of contract.

Contract completed.

B 15.

PRELIMINARY EXAMINATION OF PULL-AND-BE-DAMNED POINT, PORTSMOUTH HARBOR, NEW HAMPSHIRE, WITH A VIEW TO ITS REMOVAL, SO FAR AS THE SAME IS AN OBSTRUCTION TO NAVIGATION.

[Printed in House Doc. No. 39, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 24, 1899.

Sir: The river and harbor act approved March 3, 1899, provides for a preliminary examination of Pull-and-be-damned Point, Portsmouth Harbor, New Hampshire, with a view to its removal, so far as the same is an obstruction to navigation.

The duty of making this examination was assigned to Maj. S. W. Roessler, Corps of Engineers, and I have now the honor to submit the accompanying copy of that officer's report, dated June 14, 1899, of the results, from which it will be seen that in his opinion, concurred in by Col. G. L. Gillespie, division engineer, and by me, the locality is not worthy of improvement by the General Government at the present time.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. S. W. ROESSLER, CORPS OF ENGINEERS.

United States Engineer Office,
Portland, Me., June 14, 1899.

General: I have the honor to forward herewith the report of First Lieut. Charles Keller, Corps of Engineers, U. S. A., of a preliminary examination of "Pull-and-be-damned Point, Portsmouth Harbor, with a view to its removal, so far as the same is an obstruction to navigation," made in compliance with the river and harbor act of March 3, 1899.

A description of the character of this obstruction is fully given in Lieutenant Keller's report and will not be repeated here.

An accurate hydrographic survey of this point and vicinity was made under the direction of Col. George Thom, Corps of Engineers, U. S. A., in 1882, a tracing[1] of which is herewith inclosed in place of that of Lieutenant Keller's.

Personal inquiry by Lieutenant Keller having failed to elicit any need or demand for a better channel than now exists, the proposed improvement is not deemed worthy of being done by the United States at the present time.

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[1] Not printed. A portion of the map is printed in House Doc. No. 39, Fifty-sixth Congress, first session.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, June 20, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

This obstruction is known officially as Goat Island Ledge.

The river and harbor act of June 18, 1878, made provision for a survey of Portsmouth Harbor, New Hampshire, and the report thereon by the local officer, dated December 12, 1878 (Annual Report, Chief of Engineers, 1879, Part I, p. 282), embodies plans for the construction of a breakwater to close the channel between Great Island and Goat Island, Portsmouth Harbor "to stop the very strong current that passes through that channel on the flood tide by which the vessels passing up the harbor are thrown upon Goat Island Ledge." The act of March 3, 1879, appropriated $10,000 for beginning the breakwater, which was completed in 1880. (Annual Report, Chief of Engineers, 1882, part I, p. 506.)

With a view to further improvement of the harbor, the local officer, at the solicitation of influential citizens, caused a survey of Goat Island Ledge to be made in 1882, and for reasons stated recommended the removal of the northern end of the rock to 15 feet, so as to increase the width of the channel at that point by 110 feet. (Annual Report, Chief of Engineers, 1882, p. 507.)

It can not be ascertained that the proposed improvement is needed at this time to facilitate the navigation of the harbor in relation to the navy-yard located just above the point, nor that any commercial interest of the port will be greatly enhanced by the partial removal of the point.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

REPORT OF LIEUT. CHARLES KELLER, CORPS OF ENGINEERS.

FORT CONSTITUTION, *Newcastle, N. H., May 16, 1899.*

MAJOR: In compliance with your orders, I have the honor to report as follows upon a preliminary examination made at Pull-and-be-damned Point:

The obstruction at this point is a submerged ledge, which extends from Goat Island into the Piscataqua River opposite Fort Sullivan, on Seaveys Island. The general situation is shown upon Coast Survey chart No. 329, where the ledge is called "Goat Island Ledge."

As shown upon the tracing[1] herewith the average distance from low-water line at Goat Island to the 30-foot contour on the ledge is about 300 feet, while the channel width between the 30-foot contours on the ledge and at Seaveys Island is shown on the Coast Survey chart to be about 575 feet. The channel is, moreover, straight for a quarter of a mile above and over a mile below Pull-and-be-damned Point. Personal inquiry among persons interested in navigation fail to disclose any need or demand for a better channel than now exists.

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[1] Not printed.

The removal of Pull-and-be-damned Point would not in itself improve existing conditions, since any real difficulty to navigation in this neighborhood is caused by the necessity of making a sharp change of direction above Pull-and-be-damned Point, in order to clear the projecting point of Seaveys Island.

The locality is therefore not deemed worthy of improvement by the United States, and no estimates are submitted.

Very respectfully,

CHARLES KELLER,
First Lieutenant, Corps of Engineers.

Maj. S. W. ROESSLER,
Corps of Engineers, U. S. A.

B 16.

EXAMINATION AND SURVEY OF ISLES OF SHOALS, MAINE AND NEW HAMPSHIRE.

[Printed in House Doc. No. 255, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, January 4, 1900.

SIR: The river and harbor act of March 3, 1899, provides for a preliminary examination and survey of Isles of Shoals (Gosport Harbor), New Hampshire and Maine, with a view to building a breakwater from Smutty Nose Island to Cedar Island, and I have the honor to submit the accompanying copy of report of June 14, 1899, by Maj. S. W. Roessler, Corps of Engineers, upon preliminary examination and copy of report of December 21, 1899, with map,[1] by Maj. W. L. Fisk, Corps of Engineers, upon survey of the locality.

Major Fisk considers the locality to be worthy of improvement by the United States and presents a plan for construction of a breakwater as contemplated, which is estimated to cost, including contingencies, $30,000.

The views of the district officer are concurred in by the division engineer, Col. G. L. Gillespie, Corps of Engineers.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF ISLES OF SHOALS, MAINE AND NEW HAMPSHIRE, WITH A VIEW TO BUILDING A BREAKWATER FROM SMUTTY NOSE ISLAND TO CEDAR ISLAND.

UNITED STATES ENGINEER OFFICE,
Portland, Me., June 14, 1899.

GENERAL: I have the honor to forward herewith the report of First Lieut. Charles Keller, Corps of Engineers, United States Army, of a preliminary examination of "Isles of Shoals, with a view to building a breakwater from Smutty Nose Island to Cedar Island," made in pursuance of the river and harbor act of March 3, 1899.

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[1] Not reprinted. Printed in House Doc. No. 255, Fifty-sixth Congress, first session.

The principal island of this group is Star Island, on which is located the old village of Gosport. Gosport Harbor lies to the north of this island and is protected on its north and east by Smutty Nose Island, on the south and southeast by Star and Cedar islands, and on the east by what remains of a sea wall constructed by the United States in 1821 between Smutty Nose and Cedar islands. This wall has been beaten down by the seas to a level just above mean low water, and affords at the present time but little protection against the heavy seas of easterly storms.

To secure the shelter in Gosport Harbor which the old wall was intended to afford is the object sought by the construction of the proposed breakwater. Gosport Harbor as a harbor of refuge would probably not be considered as of great importance by the larger coastwise shipping trade, since the large harbor of refuge of Sandy Bay, only 20 miles to the south, and Portland Harbor, 52 miles, and Cape Porpoise Harbor, already authorized, 28 miles, to the north, would probably afford better shelter to the larger coastwise vessels during easterly storms. Its value, therefore, must be estimated, not by the demands of general commerce of the ocean, but by local fishing industry respecting which I have as yet no reliable statistics. The industry, however, is known to be large and important, especially in the number of vessels employed, and there appears to be a demand for a nearer haven of refuge in heavy weather for vessels frequenting this vicinity than the nearest harbors on the north and south afford, and especially Portsmouth Harbor, the entrance to which is difficult and dangerous in northeasterly gales.

With the data at my disposal, both in reference to the quantity of shipping to be benefited and the probable cost of the proposed breakwater, which can only be ascertained by an actual survey of the ground, I am unable to estimate satisfactorily the value of this work as one worthy to be done by the United States, and therefore respectfully recommend a survey, to cost not over $150, for the purpose of determining accurately the probable cost of a breakwater. Meanwhile, further inquiries will be made as regards the quantity of shipping to be benefited by such a breakwater, and with this information and that furnished by the survey a better judgment can be formed as to the value of the work as one worthy to be undertaken by the General Government than is possible with the information now at hand.

Very respectfully, your obedient servant,

S. W. ROESSLER,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, June 16, 1899.

Respectfully forwarded to the Chief of Engineers.

The act of March 3, 1821, appropriating $2,500 for a survey of this locality, on account of light-houses, contained provision for a sea wall between Smutty Nose Island and Cedar Island, Isles of Shoals, and the act of May 7, 1822, appropriated $11,500 for said work (pp. 12, 13, Laws U. S., R. and H., 1790-1876).

The act of June 23, 1874, provided for a survey of "Smutty Nose Island as to repair of breakwater, Portsmouth, N. H." Report in accordance with the act, with estimate of $85,000 for rebuilding the wall, was submitted by the local officer December 4, 1874 (A. R. C. E., 1875, Part II, p. 421).

No part of an appropriation by any subsequent act for the improvement of Portsmouth Harbor has been applied toward the rebuilding of the Smutty Nose breakwater.

In view of the statements of the local officer, contained in the above-cited report of 1874, regarding the value of Gosport Harbor as a harbor of refuge for coasting and fishing vessels, and in view of the statements contained in the within report of the local officer, June 14, 1899, I am of the opinion that the locality is worthy of improvement, and respectfully recommend that a survey be authorized, at a cost not exceeding $150, to determine the probable cost of rebuilding the breakwater between Smutty Nose and Cedar islands, upon which the Government has already expended the sum of $13,251.16. (Appropriations and Expenditures for Public Buildings and Rivers and Harbors, March 4, 1789-1882, p. 424.)

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Isles of Shoals, with a view to building a breakwater from Smutty Nose Island to Cedar Island.

It is recommended that a survey be made, after which a more reliable opinion can be formed as to the scope of improvement justified by the commercial interests involved.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

REPORT OF FIRST LIEUT. CHARLES KELLER, CORPS OF ENGINEERS.

GERRISH ISLAND, MAINE, *June 6, 1899.*

MAJOR: I have the honor to report as follows upon the preliminary examination at "Isles of Shoals, with a view to building a breakwater from Smutty Nose Island to Cedar Island."

The examination in question was made on May 23 and 24. The general situation is shown upon chart No. 330, United States Coast and Geodetic Survey, part of which is reproduced for convenience of reference upon the tracing[1] herewith, which shows, also, in detail, the soundings in the immediate vicinity of the breakwater.

As seen, there now exists the breakwater constructed in 1821, but, as the plotted soundings show, the crest has been so much reduced in height by wave action that, being but little higher than mean low water, very little shelter is afforded by the present structure.

All available evidence goes to show that a breakwater at the site in question, if of suitable height, would, during easterly storms, afford valuable shelter to the numerous small fishing and coasting vessels which frequent the waters outside of the Isles of Shoals. No such shelter exists between Cape Porpoise and Cape Ann, except Newburyport and Portsmouth harbors, and these are too far distant to be of service to the class of vessels here referred to.

To be of service a breakwater in this exposed locality should be at least as high as extreme high water. The height of 15 feet above mean low water has been adopted in the preliminary estimate herewith. The site is exposed to the entire force of easterly storms, and while the core of the breakwater may be constructed of smaller sized rock, that on the slopes and top should be in masses of from 5 to 8 tons.

Assuming a top width of 20 feet and side slopes of 45 degrees, the existing breakwater can be converted into a suitable structure by the addition to it of about 22,000 tons of rock, this quantity of rock being required in order to raise the top to the reference +15.0 before referred to.

The axis, limiting lines of the top and foot of side slopes for the proposed enlargement, are shown upon the tracing herewith.

The locality is deemed worthy of improvement by the United States.

Preliminary estimate for breakwater at Isles of Shoals between Smutty Nose and Cedar islands:

22,000 tons of rock, at $1.20	$26,400
Superintendence, etc., 10 per cent	2,600
Total	29,000

Respectfully submitted.

CHARLES KELLER,
First Lieutenant, Corps of Engineers.

Maj. S. W. ROESSLER,
Corps of Engineers, U. S. A.

SURVEY OF ISLES OF SHOALS, MAINE AND NEW HAMPSHIRE, WITH A VIEW TO BUILDING A BREAKWATER FROM SMUTTY NOSE ISLAND TO CEDAR ISLAND.

UNITED STATES ENGINEER OFFICE,
Portsmouth, N. H., December 21, 1899.

GENERAL: In compliance with the requirements of the river and harbor act of March 3, 1899, I have the honor to submit the following report upon the survey of "Isles of Shoals, with a view to building a breakwater from Smutty Nose Island to Cedar Island."

At page 7 of the "Introduction" of a small book entitled The Isles of Shoals, an Historical Sketch, by John Scribner Jenness, from the Riverside Press, 1873, I find the following:

> The harbor of the shoals, inclosed between Appledore, Haleys, Cedar, and Star islands, furnishes a tolerably secure refuge for small vessels "in distress of weather." With a view of improving this little port, Mr. Samuel Haley constructed, about the beginning of the present century, a sea wall between Smutty Nose (now named after him, Haleys Island) and the small rock on its north, called Malaga.
>
> In 1821 the United States Government reconstructed and improved this wall, and also built another of considerable length from Smutty Nose to Cedar Island on the south. While this latter sea wall stood it furnished a great protection to the inclosed anchorage ground, but the contractor, Mr. Thomas Haven, of Portsmouth, was unable

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[1] Not printed.

with the scanty appropriation at his command ($2,500) to build it sufficiently solid to resist the tremendous attacks of the ocean under a northeast storm. A few years after the sea wall had been completed it was overthrown so thoroughly that hardly a vestige of it is now remaining, only a part of its course being discernible at low water. Lying, however, as the harbor does, under the lee of Appledore, Smutty Nose, and Malaga, it affords a tolerable shelter for the fishing craft and coasters who still take refuge there. It is to be hoped that the United States Government, in view of the great importance of this little harbor as a refuge from our frequent easterly storms, will ere long make an appropriation adequate to the permanent restoration of the Cedar Island sea wall.

The foregoing is the only record relating to the old breakwater I have been able to find, there being nothing regarding it in the office files and no mention of any appropriation for it in "River and harbor improvements, 1789–1883."

The present condition of this old breakwater is shown by the profile on the map of the survey herewith, from which it will be seen that its crest averages about 1½ feet above mean low water. The stone has been spread out by the sea, so that it will form an excellent foundation for new work, which, in order to give adequate protection, should be carried to an elevation of about 15 feet above mean low tide.

The easterly slope should be about 1½ horizontal to 1 vertical and formed of large stones, weighing from 5 to 10 tons each; the inside, on a slope of 1 to 1, can be of smaller sizes down to 500 or 1,000 pounds weight. The top width is assumed at 20 feet; extreme high water is about 10½ feet above mean low tide; the height assumed will, therefore, allow for some settlement and compacting of the stone and still keep the crest above high water, which is necessary in order to furnish the desired shelter.

The estimated cost of this work is—

25,000 tons stone in place, at $1.10	$27,500
Engineering, superintendence, and contingencies	2,500
Total	30,000

This place is of considerable importance as a harbor of refuge for the numerous fishing boats and small vessels along this coast, and, in my judgment, the above comparatively small expenditure is well warranted by the interests involved.

Reliable statistics of the amount of shipping directly interested in this work can not be obtained, but would comprise all the great fleet of small vessels upon this coast.

Although this survey appears in the river and harbor act above mentioned, under the head "New Hampshire," the work lies wholly in Maine, the line between that State and New Hampshire passing between Cedar and Star islands.

Very respectfully, your obedient servant,

W. L. Fisk,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, December 26, 1899.

Repectfully forwarded to the Chief of Engineers, concurring in the views of the district officers, with the understanding that the cross sections are only tentative, and subject to revision at the time the project for improvement is submitted.

The water at a distance of 1,000 feet east of the proposed breakwater is about 50 feet deep, and thence deepens very rapidly seaward.

It is probable that the outer slope may judiciously be lengthened.

The capping stones at crest should certainly be arranged with greater care than shown, and with their shortest dimensions to the sea.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

B 17.

EXAMINATION AND SURVEY OF PIERS AND BREAKWATER AT ROCKPORT, MASSACHUSETTS.

[Printed in House Doc. No. 363, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 26, 1900.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of piers and breakwater at Rockport, Mass., and I now have the honor to submit herewith copy of report dated June 26, 1899, by Col. Charles R. Suter, Corps of Engineers, upon said examination, and copy of report of January 19, 1900, by Maj. W. L. Fisk, Corps of Engineers, giving the results of a survey of this locality.

From the report of survey herewith it appears that the breakwaters designed to shelter Rockport Harbor have so far deteriorated that they fail to effect the purpose for which they were built, and, in the opinion of Major Fisk, they should be rebuilt to a height of about 10 feet above high water. The removal of certain dangerous and obstructive rocks in the harbor is also recommended. The cost of the work proposed is estimated at $22,481.80.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF PIERS AND BREAKWATER AT ROCKPORT, MASS.

United States Engineer Office,
Boston, Mass., June 26, 1899.

General: In accordance with instructions contained in your letter of March 15, 1899, I have the honor to submit the following report upon the preliminary examination of piers and breakwater at Rockport, Mass.

Rockport, Mass., is situated on the eastern side of Cape Ann, Massachusetts, on the shores of Sandy Bay, and about 37 miles northeast of Boston, Mass.

The shores of Sandy Bay are rock bound, and in their natural state afforded no sheltered anchorage, making it necessary to construct artificial harbors to provide shelter for vessels engaged in the commerce of this port. Piers for this purpose were constructed at Rockport, on the south shore of Sandy Bay, by private enterprise, in 1811 to 1817, and a breakwater was built at this point by the United States Government in 1837 to 1846, at a cost of about $69,000.

The commerce of this harbor consists of supplies of coal, etc., for local consumption; of fishing vessels hailing from the port and landing their catches of fish, and large shipments of granite from the numerous quarries situated on the shores of the bay.

An approximate estimate of the annual value of this commerce is $820,000, and the vessels engaged in its transportation are dependent for shelter upon Rockport Harbor and two other small artificial harbors on the west shore of Sandy Bay.

The harbor is worthy of improvement, and I respectfully recommend an allotment of $500 for making a survey of the piers and breakwater and the harbor.

Very respectfully, your obedient servant,

Chas. R. Suter,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of the piers and breakwater at Rockport, Mass.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 24, 1899.

Approved.

Elihu Root,
Secretary of War.

SURVEY OF PIERS AND BREAKWATER AT ROCKPORT, MASS.

United States Engineer Office,
Portsmouth, N. H., January 19, 1900.

General: I have the honor to submit the following report of the survey of piers and breakwater at Rockport, Mass., made in compliance with the requirements of the river and harbor act of March 3, 1899.

The report upon the preliminary examination was made June 26, 1899, by Col. Charles R. Suter, Corps of Engineers, and the survey, which was in progress at the time the work was transferred to me, was completed under his direction.

A tracing[1] of the map is herewith.

Rockport is situated about 37 miles northeast of Boston, Mass., upon the northeastern shore of the rocky promontory of Cape Ann, which forms the northern limit of Massachusetts Bay. The town extends along both shores of Sandy Bay, which is open to the full sweep of storms from north around to east.

The shores of the bay are high and rocky, and shelter for the shipping of the town has been obtained by means of small artificial harbors, four of which have been constructed upon the shores of the bay. Of these, Rockport Harbor, formed by the piers and breakwater at Rockport, is the largest and most important.

No plans or records of the construction of this breakwater exist in the files of this office, but from a list of appropriations and expenditures for rivers and harbors (published as House of Representatives Ex. Doc. No. 64, Forty-eighth Congress, first session, p. 157) it appears that on March 2, 1829, Congress appropriated $150—

> for examining the piers erected at Sandy Bay, to report the condition of the same, and what works are necessary to make a good and safe harbor at that place, together with an estimate of the cost.

This survey was made in 1829. The report theron was submitted to the Department April 1, 1830, by Col. Hartman Bache and was transmitted to Congress by the President April 23, 1830. From this report the following is quoted:

> * * * The piers, erected by a company at a cost of $33,542.50, were commenced in 1811 and finished in 1817. * * *
>
> When the capacity of the harbor made by the piers and its very limited depth are considered in connection with their cost, it must be regretted that the selection had not fallen on the cove to the southward of Fort Point. This position, which is acessible at all times of the tide * * * may be made perfectly secure for a sum not exceeding the cost of these piers. * * *
>
> * * * It is believed that so soon as the works about to be recommended shall have been constructed the érection of commodious and substantial wharves by individual enterprise will supersede the necessity of anchoring.

A plan accompanying the report has indicated upon it the location of two piers at the mouth of the cove above mentioned, one extending easterly from Fort Point (now known as Bearskin Neck), and a shorter one extending westerly from Allens Head (now known as Norwoods Head), leaving an entrance about 220 feet wide between the pierheads.

Appropriations for this work by Congress from 1836 to 1847, inclusive, aggregated $69,082.57, or, including also the $150 appropriated in 1829 for the survey, a total of $69,232.57.

From the original report of Colonel Bache, it appears that at the time of the construction of the breakwaters no wharves existed in the cove they were designed to shelter, but his prediction as to their construction has been fulfilled, as the harbor now has three substantial stone wharfs, at which are landed the greater part of the supplies of coal, lumber, etc., for the town of Rockport and catches of fish by vessels of the fishing fleet.

The old harbor, about 2 acres in area, all of which is dry at low water, formed by the piers constructed in 1811–1817, has been practically abandoned owing to lack of sufficient depth. The sheltering piers extend, one northward from the mainland for about 260 feet, the other westward from the shore of Bearskin Neck about 325 feet and past the end of the first pier, to cover the entrance between them, the width of the entrance being about 60 feet.

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[1] Not reprinted. Printed in House Doc. No. 363, Fifty-sixth Congress, first session.

These piers consist of well-laid dry granite walls, rising to a height of 15 feet above mean low water, and filled with granite bowlders and earth.

The Bearskin Neck pier affords the principal shelter to the harbor, and upon its seaward face a substantial sea wall was constructed of stones of about 2 tons weight, laid dry. This wall was 100 feet long, 15 feet wide, and rose about 11 feet above the general level of the pier, or 26 feet above mean low water. From the inner end of this wall another sea wall, constructed of heavy, dry rubblestone, extended along the remainder of the seaward face of the pier and over the ledges which form the seaward shore line of Bearskin Neck, to a junction with the new Government breakwater, a distance of about 900 feet, its purpose being to protect the buildings on Bearskin Neck from storm seas.

These protective works were constructed by private enterprise and had well served their purpose until the very severe storm of November 27, 1898, made four breaches through the sea wall at the places indicated on the plan.

The most serious break occurred at the Bearskin Neck pier, where, for a length of 75 feet, the sea cut through both sea wall and pier, depositing the débris in the entrance to the old harbor. Three other breaches, aggregating 150 feet in length, were made through the rubblestone sea wall, the stone from which was washed inland; and the sea, sweeping through the breaches, carried from their foundations and destroyed a number of buildings upon the Neck.

All of this old material could be used for repairs, but, as they would be for the purpose only of protecting the buildings on the Neck, they are not thought to be properly within the usual scope of Government work.

The area of the cove known as Rockport Harbor, which lies behind the breakwaters built by the Government in 1836–1839, is about 15 acres.

The main breakwater extends from Bearskin Neck in an easterly direction. It is about 900 feet long, of which about 375 feet at the shore end is in an excellent condition. This portion is founded upon the ledges of the Neck, and consists of well-constructed dry masonry, vertical walls filled with granite bowlders and earth. The outer end of this portion is 71 feet wide and about 22 feet above mean low water. The outer portion of this breakwater, about 525 feet in length, has been badly damaged by the sea, and no traces remain of any regularity of form of construction. It consists of an irregular mound of rubblestone about 125 feet wide between low-water lines, and shows indications of having been gradually swept shoreward by the sea. The sea face has a long easy slope, and the shoreward face stands on a relatively steep slope. At extreme high tides about 400 feet of it is practically submerged, and in easterly storms the sea sweeps over it throughout its length.

A smaller breakwater extends northward from Norwoods Head about 200 feet, leaving an entrance channel 220 feet wide between their low-water lines. This breakwater has been almost totally destroyed by the sea, and in its present condition consists of an irregular pile of rubblestone spread over an area about 200 feet square. At the shore end a section of sea wall 100 feet long still stands with its crest about 25.4 feet above mean low water.

No records are available to show to what height above low water these breakwaters were built, but from what information can be obtained from those whose memory goes back to the earlier years of these works it appears probable that the crests of both were originally at the grades of the portions which still remain undisturbed.

The stone in the breakwaters has been so worn by sea action as to render it unfit for use in rebuilding; but both breakwaters in their present condition will be excellent foundations for any form of superstructure which may be built upon them.

Rockport Harbor is a natural cove, with its area somewhat enlarged by the projection of the large breakwater into the bay. It is about 1,400 feet long and 700 feet wide. Three wharves, with a total frontage of about 2,150 running feet, lie under the shelter of the breakwaters.

At mean low water 12 feet draft can be carried between the breakwaters and about halfway up to the first wharf, but from this point the water shoals rapidly, so that but 6 feet can be carried to the outer ends of the first two wharves and about 4 feet to the third.

On the eastern side of the harbor there are two rocks which are dangerous to navigation, viz, "Dresser Rock," at the entrance, in 10 feet of water, with but 0.3 foot of water over it, and "Plaster Ledge," abreast of the end of the first wharf, in about 9 feet of water, with but 5.3 feet over it.

On the western side the harbor is obstructed by a number of submerged bowlders. The channel has a least width of 150 feet at the entrance and 200 feet thence to the wharves free from obstructions, but because of these bowlders the approach to the wharves is difficult and dangerous for sailing vessels.

The vessels formerly frequenting this harbor have been superseded by larger and better ones of increased draft and tonnage. Few of these vessels can now enter the harbor and approach the wharves excepting at high water, which results in inconvenience and loss of time to the shipping interests.

The commerce of this harbor consists of supplies of coal, etc., for local consumption; of fishing vessels hailing from the port and landing their catches of fish, and large shipments of granite from the numerous quarries situated on the shores of the bay. An approximate estimate of the annual value of this commerce is $820,000, and the vessels engaged in its transportation are dependent for shelter upon Rockport Harbor and two other small artificial harbors on the west shore of Sandy Bay.

The breakwaters designed to shelter Rockport Harbor have so far deteriorated that they fail to effect the purpose for which they were built; they should, therefore, be rebuilt to a height of about 10 feet above high water (18.5 feet above low water), with heavy rubblestone, and the principal rocks in the harbor should be removed. The height recommended for this new work is not quite equal to that of the old, for the reason that the great Sandy Bay breakwater, when completed, will break the force of all waves approaching the harbor.

The estimate of cost is:

Removing rocks, 200 tons, at $10	$2,000.00
Repairing main (northern) breakwater, 9,435 tons rubble, at $1.50	14,152.50
Repairing small (southern) breakwater, 2,857 tons rubble, at $1.50	4,285.50
	20,438.00
Engineering, superintendence, and contingencies	2,043.80
Total	22,481.80

In the foregoing I have drawn from Colonel Suter's report of preliminary examination, and largely from the report upon the survey by Mr. T. T. Hunter Harwood, assistant engineer, under whose immediate supervision the survey was made.

Very respectfully, your obedient servant,

W. L. Fisk,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, January 20, 1900.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

The report on the preliminary examination of the harbor did not pass through this office.

The outer breakwater in process of construction does not give adequate protection in its present condition to the commerce of the port, and it is not expected that such protection will be given for many years to come.

For this reason it is proper that the breakwater covering the small inner harbor should be repaired as early as practicable.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

B 18.

PRELIMINARY EXAMINATION OF BEVERLY HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 52, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 28, 1899.

Sir: I have the honor to submit herewith a copy of report, dated August 9, 1899, by Col. Charles R. Suter, Corps of Engineers, of the results of a preliminary examination of Beverly Harbor, Massachusetts, made to comply with provisions of the river and harbor act approved March 3, 1899.

It is the opinion of Colonel Suter, concurred in by me, that this harbor is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF COL. CHARLES R. SUTER, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Boston, Mass., August 9, 1899.

GENERAL: In accordance with instructions contained in your letter of March 15, 1899, I have the honor to submit the following report upon the preliminary examination of Beverly Harbor, Massachusetts:

Beverly Harbor is situated immediately north of Salem Harbor, Massachusetts, and is separated therefrom by Salem Neck. It is formed by the confluence of North River, Essex Branch, and Beverly Creek—three branches of a tidal inlet from the extreme western end of Salem Bay. The head of the harbor is crossed by two bridges with draw openings of 33 feet, through which vessels must pass to enter the above-mentioned rivers.

The channel of the harbor is about 9,000 feet long from its entrance to the drawbridge, and has a depth of at least 18 feet at mean low water, and a least width of 150 feet up to within 500 feet of the first drawbridge. The depth of water through the draw is 12 feet at mean low water.

The commerce of the harbor consists of supplies of coal, lumber, etc., for Beverly, and similar supplies in smaller quantity for the town of Danversport and city of Salem through the tidal branches westward of the drawbridges.

A survey of this harbor was made by the United States Government in 1889 with a view to its improvement. A report and plan of this survey were submitted on December 2, 1889, and were printed as House Ex. Doc. No. 27, Fifty-first Congress, first session.

I am of the opinion that the present condition of the harbor and its approaches is sufficient for its commerce, and that it is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

CHAS. R. SUTER,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

B 19.

HARBOR OF REFUGE, SANDY BAY, CAPE ANN, MASSACHUSETTS.

[Printed in House Doc. No. 453, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, February 16, 1900.

Sir: The river and harbor act of March 3, 1899, in the item appropriating $250,000 for improving harbor of refuge at Sandy Bay, Cape Ann, Massachusetts, provided that "the Secretary of War shall appoint a board of three engineers, whose duty it shall be to examine said project and report whether any modification of the same should, in their judgment, be made, with an estimate of the cost of completing the same," and I have now the honor to submit herewith copies of reports, dated July 3, 1899, and February 13, 1900, with map,[1] upon the subject, by a Board of Engineers constituted in accordance with the above-quoted requirement of law.

The Board, in its report of July 3, 1899, states that the plan of substructure embodied in the present general project has given general satisfaction and no changes are required therein, whether as to alignment, cross section, or methods of construction.

The Board submits, in its report of the 13th instant, a detailed project for carrying on the work with reference to both superstructure and substructure, their cross sections and slopes, and the various dimensions and weights of stones to be used, the estimated cost of completing the work, exclusive of the part already built and contracted for, but including contingencies, being given as $5,891,832.70.

Copies of these reports are also submitted to the Secretary of War with my letter of this date returning Senate resolution of the 9th instant on the subject of the harbor of refuge at Sandy Bay.

Section 22 of the river and harbor act approved March 3, 1899, also provides for "Sandy Bay: Resurvey and estimate of cost at breakwater," and the report now submitted includes the information contemplated by this item of the act.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORTS OF BOARD OF ENGINEERS UPON THE PROJECT FOR IMPROVING THE HARBOR OF REFUGE AT SANDY BAY, CAPE ANN, MASSACHUSETTS, WITH ESTIMATE OF COST OF COMPLETING SAID IMPROVEMENT.

United States Engineer Office,
Boston, Mass., July 3, 1899.

General: The Board of Engineer Officers constituted by paragraph 2, Special Orders, 14, headquarters Corps of Engineers, March 16, 1899, has the honor to submit the following report:

The Board assembled at the United States engineer office in Boston at 11 a. m., June 19, 1899, at the call of the senior member. Present, Col. Charles R. Suter, Corps of Engineers; Maj. D. W. Lockwood, Corps of Engineers; Maj. Smith S. Leach, Corps of Engineers.

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[1] Not reprinted. Printed in House Doc. No. 453, Fifty-sixth Congress, first session.

The history of the project for Sandy Bay breakwater was gone over, drawings examined, and the subject referred to the Board was generally discussed. The project submitted by Colonel Suter for the expenditure of the current appropriation, bearing the indorsement of the Chief of Engineers dated May 31, 1899, was laid before the Board by the senior member. The Board decided to visit the locality the next day, and at 2 p. m. adjourned to meet at Rockport, Mass., on Tuesday, the 20th instant.

The Board met at Rockport at 12 m. on Tuesday, pursuant to the foregoing adjournment; all the members present. An inspection of the bay and breakwater was made on a steamer, and parties acquainted with the locality and interested in the work were heard. After landing the general discussion was resumed, and the following conclusions were reached:

First. There appear to have been no changes in the bottom or in the disposition of the material in the substructure of character and amount sufficient to demand a resurvey. The Board feels justified in basing conclusions on existing data.

Second. The Board finds that the plan of substructure embodied in the present general project has given satisfactory results and that no changes are required therein, whether as to alignment, cross section, or methods of construction.

Third. The Board finds itself unable at this time to formulate definite conclusions with regard to the plan of superstructure best adapted to this case, desiring time for further study of the subject and for obtaining certain pertinent data from other recent constructions of similar character, particularly from Point Judith Breakwater.

Fourth. In view of the fact that the most favorable season for work is fast approaching, the Board considers it proper to express its conclusions with regard to the substructure, in order that, if thought proper, work upon the substructure may be commenced.

Fifth. The Board therefore recommends that the above-mentioned project of Colonel Suter be approved so far as relates to the substructure.

At 4 p. m. June 20 the Board adjourned to meet at the call of the senior member.

Respectfully submitted.

CHAS. R. SUTER,
Colonel, Corps of Engineers.
D. W. LOCKWOOD,
Major, Corps of Engineers.
SMITH S. LEACH,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

UNITED STATES ENGINEER OFFICE,
Boston, Mass., February 13, 1900.

GENERAL: The Board of Engineer Officers, constituted by Special Orders, No. 14, paragraph 2, headquarters Corps of Engineers, March

16, 1899, and reconvened at Portsmouth, N. H., by Special Orders, No. 67, headquarters Corps of Engineers, December 28, 1899, met at the United States engineer office in Portsmouth at 10 a. m. January 9, 1900, pursuant to the call of the senior officer. All of the members of the Board were present.

Major Fisk, district officer, placed before the Board the reports and drawings pertaining to the Sandy Bay Breakwater. The Board entered upon the consideration of the business before it, holding sessions on the day above named and the day following. After full consideration of the subject, the Board has arrived at the following conclusions, in addition to those contained in the Board's preliminary report relating to the construction of the substructure:

For the locality of Sandy Bay Breakwater the plane of quiescence, or the limit of the effect of wave motion upon such a structure, may safely be taken at 25 feet below low water. Below this plane the substructure may be given a slope of 1 on 1 on both sides, and, in the opinion of the Board, will be permanent at that slope. Above this plane the structure should have a slope of 1 on 2 outside and 1 on 1 inside, and should be 30 feet wide at reference 17 above mean low water.

The Board divides the superstructure and the substructure by a plane 12 feet below low water. The part of the breakwater above this plane, to be referred to hereafter as the superstructure, should have its front and rear faces composed of selected stones, weighing not less than 8 tons for the sea face and 3 tons for the inner face, having the least dimension not less than one-fourth nor more than two-thirds of the greatest dimension. The stones in the two faces should be laid horizontal, with the longest dimension perpendicular to the axis of the structure. The top course, with its upper bed in reference 17, should be composed of stones of not less than 10 tons, having the relative dimensions specified, no stone in the outer row to be less than 15 feet long and none in the inner row less than 10 feet long; the tops to lie in the plane fair enough to receive the course of capstones.

The body of the superstructure between the faces described should be of similar stones as to size and shape, dumped at random.

On the rubble crown at reference 17 there should be laid a row of quarry-faced capstones, weighing not less than 20 tons each, approximately 3 by 5 feet in end section, laid on edge and transversely in as close contact as possible; the sea ends to be in line about 5 feet from the sea edge of the rubble crown.

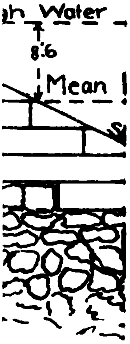
The substructure to have a sea slope of 1 on 2 to the plane 25 feet below low water, and below that plane the natural slope; the inner slope to be 1 on 1 throughout.

The substructure should be composed of random rubble, no stone of which should weigh less than 200 pounds, and 50 per cent of the stones should be of not less than 2 tons weight.

The Board is of opinion that no superstructure should be built on substructure that has been in place less than a year, and, if the exigencies of construction permit, a longer time should be allowed.

It is recommended that any balance of the current appropriation beyond the sum now allotted to the substructure be expended in the construction of the superstructure on the older part of the breakwater.

With regard to the connection of the structure with Averys Ledge,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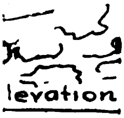
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the Board renews the recommendation of the former Board of Engineers, as follows: "The experience obtained from this work, and investigations made during its progress, will determine whether the head of the breakwater at Avery Ledge can be formed of large natural or artificial blocks," or whether some other method should be adopted.

ESTIMATES.

The estimate of quantities on the basis of the proposed cross section, prepared for the Board by the district officer, is as follows:

	Net tons.
Substructure	4,792,487
Superstructure	1,434,055
Capstones	74,865
Total	6,301,407

These figures relate to the entire structure, and include the part of it already built. The amount that will have been placed when the present contract is completed is 1,310,000 tons. Most of this is actually within the limits designated by the Board as substructure, but some of it is within the limits of the Board's superstructure. As related to the new cross section, however, and considering some difficulties of incorporating the old work into the new superstructure, it seems advisable, for the purposes of estimate, to consider all of the old work as forming part of the substructure of the new work. Deducting the amount stated (1,310,000 tons) from the foregoing estimate of substructure (4,792,487), and applying probable unit prices, the following estimate of the cost of completing the breakwater, as required by the act of March 3, 1899, results:

Substructure, 3,482,487 net tons, at $0.65	$2,263,616.55
Superstructure, 1,434,000 net tons, at $2	2,868,000.00
Capstones, 74,865 net tons, at $3	224,595.00
Total	5,356,211.55
Add for contingencies, 10 per cent	535,621.15
Total estimate	5,891,832.70

A profile of the cross section proposed by the Board, and herein described, is transmitted herewith.

Respectfully submitted.

CHAS. R. SUTER,
Colonel of Engineers, Senior Member.
D. W. LOCKWOOD,
Major of Engineers.
SMITH S. LEACH,
Major of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

APPENDIX C.

IMPROVEMENT OF RIVERS AND HARBORS IN EASTERN MASSACHUSETTS SOUTH OF AND INCLUDING LYNN HARBOR.

REPORT OF COL. CHAS. R. SUTER, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Lynn Harbor, Massachusetts.
2. Mystic and Malden rivers, Massachusetts.
3. Mystic River, Massachusetts, below mouth of Island End River.
4. Boston Harbor, Massachusetts.
5. Town River, Massachusetts.
6. Weymouth River, Massachusetts.
7. Scituate Harbor, Massachusetts.
8. Duxbury Harbor, Massachusetts.
9. Plymouth Harbor, Massachusetts.
10. Provincetown Harbor, Massachusetts.
11. Chatham Harbor, Massachusetts.
12. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEY.

13. Winthrop Harbor, Massachusetts.
14. Cohasset Harbor, Massachusetts.
15. Sandwich Harbor, Massachusetts.

HARBOR LINES.

16. Charles River at Cambridge, Massachusetts.

United States Engineer Office,
Boston, Mass., July 20, 1900.

General: I have the honor to transmit herewith annual reports for the works of river and harbor improvements in my charge for the fiscal year ending June 30, 1900.

* * * * * * *

Very respectfully, your obedient servant,

Chas. R. Suter,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

C 1.

IMPROVEMENT OF HARBOR AT LYNN, MASSACHUSETTS.

[This work was in the charge of Maj. W. L. Fisk, Corps of Engineers, from September 30, 1899, to March 31, 1900.]

Lynn Harbor is 9 miles northeast from Boston.

The original channels were narrow and crooked, and had but 6 feet of depth at mean low water.

The project for improvement was adopted in 1884. It proposed a channel 200 feet wide, 10 feet deep at mean low water, through the outer and inner bars. It is supposed that the inner channel will require occasional dredging, and a training wall was proposed, if required, to aid in keeping the outer channel open.

On September 24, 1888, it was proposed to extend the inner channel 400 feet within the harbor line and to excavate at its inner end an anchorage basin 500 by 300 feet in area, 10 feet deep at mean low water, at a cost of $25,000.

The estimated cost of the original project was $157,000; adding the cost of the extension of September 24, 1888, the estimated cost is $182,000.

The river and harbor act of June 3, 1896, ordered a survey of this harbor "with a view to securing a channel 300 feet wide and 15 feet deep at mean low water," and on March 27, 1897, a project was submitted in accordance with this act, the estimated cost of which was $441,813.07.

No appropriation has as yet been made for work under this project.

The total appropriations to date have been $128,500.

The total expenditures to June 30, 1899, were $116,094.20 on the main project, and $5,000 on the western or Saugus River channel under act of June 13, 1892. At that date all dredging under approved projects had been completed.

The approach of vessels to the city wharves was greatly facilitated by the improvement.

No operations have been in progress during the fiscal year, and at the date of this report the outer and inner main ship channels are 200 feet wide, 10 feet deep at mean low water, and the project of improvement is completed with the exception of the training wall.

To complete this improvement will require an appropriation of $53,500 for the construction of the training wall, but the necessity for this work is not yet apparent.

Lynn is a port of entry in the collection district of Marblehead, Mass. The nearest light-house is Egg Rock (Nahant) Light, 3 miles distant.

Money statement.

July 1, 1899, balance unexpended	$7,405.80
June 30, 1900, amount expended during fiscal year	381.44
July 1, 1900, balance unexpended	7,024.36

The dates and amounts of appropriations for this work are as follows:

Act of—		Act of—	
August 2, 1882	$60,000	August 18, 1894	$7,500
August 5, 1886	6,000	June 3, 1896	20,000
August 11, 1888	10,000		
September 19, 1890	15,000	Total	128,500
July 13, 1892	10,000		

COMMERCIAL STATISTICS.

The accompanying commercial statistics were furnished by the collector of customs at Marblehead, Mass.:

Amount of revenue collected:

1898	$3,192.91
1899	299.31
1900	1,284.66

Shipping.

	1898.		1899.		1900.	
	No.	Tons.	No.	Tons.	No.	Tons.
Entrances:						
Foreign	22	2,138	7	661	9	848
Domestic	782	182,271	916	180,000	2,198	688,297
Clearances:						
Foreign	24	2,395	7	661	28	6,356
Domestic	737	182,271	916	180,000	2,198	688,297

Imports.

	1898.	1899.	1900.
Coal ....tons..	145,523	141,523	197,028
Iron ....do...	....	....	2,019
Lumber ....feet..	2,616,000	290,000	131,303
Miscellaneous *a* ....tons..	150,000	60,000	110,000

a Lime, cement, sand, bricks, stone, hay, etc.

All classes of vessels frequent the harbor, to a maximum draft of 18 feet.

C 2.

IMPROVEMENT OF MYSTIC AND MALDEN RIVERS, MASSACHUSETTS.

Mystic River empties into the inner harbor of Boston, Mass.

Malden River is tributary to the Mystic River, their junction being 3 miles above the mouth of the latter.

Originally no low-water channel existed in either river.

A project for the improvement of Mystic River was submitted May 9, 1891. It proposed to widen and deepen the natural channel to the head of navigation in Medford, a distance of about 4½ miles, so that it should be 100 feet wide, 6 feet deep at mean low water to the first turn above Denning's wharf, thence 4 feet deep at mean low water, the width gradually contracting to 50 feet at the upper end. The estimated cost of this project was $25,000.

The original project for the improvement of Malden River was submitted December 1, 1880. It contemplated the excavation of a channel 100 feet wide and 12 feet deep at mean high water up to the second drawbridge, with two cut-offs, one east of the island near the junction of the Malden and Mystic rivers and the other through the marsh land about half a mile above, at a cost of $35,000.

This project was modified in 1882. It was then proposed to make the natural channel 100 feet wide and 12 feet deep at mean high water to the first bridge, and thence 75 feet wide to the second bridge, at an estimated cost of $40,000. The mean rise or fall of the tide is 9.8 feet.

The estimate was increased to $47,000 in 1884. (Annual Report 1884 p. 551.)

Ten thousand dollars was appropriated for this work by the act of 1882, and expended (1883–84) in making the channel from the mouth to the drawbridge in Malden, a distance of 1¼ miles, at least 50 feet wide (70 feet at turns) and 12 feet deep at mean high water.

November 1, 1890, a project was submitted for the improvement of this river in conjunction with Mystic River. This project proposed the completion of the project of 1882, at an estimated cost of $37,000.

The total appropriations to date under present approved projects have been $35,000 for both rivers.

The expenditures to June 30, 1899, under the present projects were $29,973.08.

At that date the channel in Mystic River had been dredged 6 feet deep at mean low water and 100 feet wide to the first turn above Denning's wharf, and for a farther distance of 4,000 feet above this turn 4 feet deep and of full projected width. The channel in Malden River had been dredged to full projected depth and width up to the first bridge. Nothing had been done above this bridge.

No operations have been in progress during the fiscal year on Mystic River, for the reason that the expenditure of the small sum available would result in no material benefit to navigation.

In Malden River a shoal which had formed in the improved channel was removed during September, 1899, under informal agreement with the Eastern Dredging Company, at a cost of $938.72.

At the date of this report 6 feet draft can be carried at mean low water in Mystic River up to Denning's wharf, in Somerville. Above this point no benefit has resulted to navigation, for the reason that the improvement has not yet been carried up to the wharves in Medford.

In Malden River the dredged channel has gradually shoaled, so that at present but 10 feet at mean high water can be carried to the drawbridge in Malden.

To complete the improvement of Mystic River would require an appropriation of $7,500 and of Malden River $19,500, a total of $27,000, all of which could be expended to advantage during the fiscal year ending June 30, 1901.

Mystic and Malden rivers are in the collection district of Boston, Mass., of which Boston is the port of entry. The nearest light-house is on Long Island, Boston Harbor, Massachusetts.

Money statement.

July 1, 1899, balance unexpended	$5,026.92
June 30, 1900, amount expended during fiscal year	993.86
July 1, 1900, balance unexpended	4,033.06
Amount (estimated) required for completion of existing project	27,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	27,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

The dates and amounts of appropriations for this work are as follows:

For Malden River, by act of August 2, 1882	$10,000
For Mystic and Malden rivers, by act of July 13, 1892	10,000
For Mystic and Malden rivers, by act of August 18, 1894	10,000
For Mystic and Malden rivers, by act of June 3, 1896	10,000
For Mystic and Malden rivers, by act of March 3, 1899	5,000
Total	45,000

Commercial statistics are included in the statement for Boston Harbor, Massachusetts.

C 3.

IMPROVEMENT OF MYSTIC RIVER, MASSACHUSETTS, BELOW THE MOUTH OF ISLAND END RIVER.

Mystic River empties into the inner harbor of Boston near the Charlestown Navy-Yard, and its navigable channel is about 6 miles in length. The cities of East Boston, Chelsea, Everett, and Medford have water frontage on its northern bank; Medford, Somerville, and Charlestown on its southern bank.

In its present condition about 18 feet draft at mean low water can be carried through Chelsea Bridge to near the end of Island End River.

This depth has been obtained through private enterprise by dredging, and above Island End River the channel shoals rapidly, so that at the Boston and Maine Western Division drawbridge, about 1½ miles above that river, the draft of vessels is limited to 6 feet at mean low water.

The remainder of the channel to the head of navigation is now being improved under appropriations for Mystic and Malden rivers, Massachusetts.

The project for the improvement of Mystic River was submitted on January 18, 1899, in accordance with Department letter of January 13, 1899, and proposed to dredge a channel 25 feet deep at mean low water and 300 feet wide from the mouth of the river to a point 3,500 feet above Chelsea Bridge, at an estimated cost of $321,445.52.

The river and harbor act of March 3, 1899, appropriated $50,000 for this improvement.

On March 17, 1899, a survey of the river was authorized, for the purpose of preparing a project for the expenditure of the available funds.

From information obtained in this survey a new estimate of cost was submitted on August 23, 1899, reducing the cost to $267,547.50.

The total appropriations to date have been $50,000.

The expenditures to June 30, 1899, were $493.45.

At that date no work had been done on the proposed project.

On August 23, 1899, a project was submitted for the expenditure of the available funds. This project proposed to dredge a channel 100 feet wide and 25 feet deep at mean low water from the upper end of the main ship channel of Boston Harbor up to the mouth of Island End River, and was approved September 9, 1899.

On November 8, 1899, a contract was entered into with Mr. Charles H. Souther, of Boston, Mass., to dredge 200,000 cubic yards, more or less, of material from the river at 22 cents per cubic yard.

An abstract of this contract will be found annexed.

Dredging under this contract was commenced January 2, 1900, and at the date of this report 97,753 cubic yards have been dredged, and operations are now in progress.

No material benefit has as yet accrued to navigation, as the continuous depth of 25 feet has not been obtained by the operations.

The water frontage on both sides of the section of the river included in this improvement is rapidly increasing in commercial importance, and the advantage to commerce by completion of the improvement will be the opening up of this channel to vessels of greater draft and tonnage.

Mystic River is in the collection district of Boston, Mass., of which Boston is the port of entry. The nearest light-house is on Spectacle Island, Boston Harbor, Massachusetts.

Money statement.

July 1, 1899, balance unexpended		$49,506.55
June 30, 1900, amount expended during fiscal year		23,254.74
July 1, 1900, balance unexpended		26,251.81
July 1, 1900, outstanding liabilities	$3,382.92	
July 1, 1900, amount covered by uncompleted contracts	22,434.34	
		25,817.26
July 1, 1900, balance available		434.55
Amount (estimated) required for completion of existing project		217,547.50
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		217,547.50

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

The dates and amounts of the appropriations for this work are as follows:

By river and harbor act of March 3, 1899	$50,000

Abstract of proposals for dredging in Mystic River, Massachusetts, below the mouth of Island End River, opened October 27, 1899, by Col. Charles R. Suter, Corps of Engineers.

No.	Name and address of bidder.	Price bid per cubic yard— For dredging.	Price bid per cubic yard— For removal of bowlders over 8 tons each.	Total yards that can be dredged.
		Cents.		
1	Charles H. Souther, Boston, Mass. a	22	$5.00	204,545
2	Augustus B. Martin, Boston, Mass	25	5.00	180,000
3	Rodermond & Smith, New York, N. Y	29.4	15.00	153,061

a Lowest bid.

The contract was awarded to Charles H. Souther, with the approval of the Chief of Engineers.

ABSTRACT OF CONTRACT IN FORCE JUNE 30, 1900.

Contract dated November 8, 1899; Charles H. Souther, of Boston, Mass., contractor; to dredge 200,000 cubic yards, more or less, at 22 cents per cubic yard; to be commenced November 30, 1899; to be completed October 31, 1900.

Commercial statistics are included in the statement for Boston Harbor, Massachusetts.

C 4.

IMPROVEMENT OF HARBOR AT BOSTON, MASSACHUSETTS.

Boston Harbor consists essentially of an inner and an outer harbor united by a deep waterway, and each accessible from the sea by a distinct channel, widening into a deep and spacious roadstead.

1. *Inner harbor.*—This harbor lies to the north and westward of Long Island and has deep water and good anchorage in the President Roads, seaward of Lower Middle Bar, and also near the city westward of Upper Middle Bar.

Four rivers discharge their waters into the basin—the Charles, Mystic, and Chelsea rivers from the north and the Neponset from the south. The direct entrance from the sea is by Broad Sound.

2. *Outer harbor.*—This harbor lies to the southward of Long Island and has a fine anchorage in Nantasket Roads, as well as in Hingham Bay, a well-sheltered harbor southeast of Peddocks Island. It connects with the inner harbor by the main channel through the Narrows and by secondary channels east and west of Long Island. It is reached from the sea from Nantasket Roads, which lie south of Georges and Great Brewster islands, and is marked at the sea entrance by Boston Light.

Weymouth and Weir rivers empty into the outer harbor.

Both the inner and outer harbors are subdivided into several minor harbors and contain many islands, which shelter the anchorage from winds and storm waves.

The range of the tide at the navy-yard is 9.8 feet and at the entrance to the outer harbor 9.4 feet. A sketch of the harbor was printed in the Annual Report of the Chief of Engineers for the year 1888, page 454.

The object of the improvement is, first, to preserve the harbor by protecting the islands and headlands; second, to improve it by widening, deepening, and straightening the channels.

The works of preservation consist of sea walls, aprons, jetties, etc., which protect the shores of the islands and headlands, prevent additional wash into the channels, control the tidal scour, and preserve the full height of anchorage shelter for vessels in the roadsteads.

The works of improvement have been by dredging and blasting.

The total appropriations from 1825 to date have been $4,080,027.10.

The total expenditures to June 30, 1899 (not including outstanding liabilities), were $2;977,243.39.

WORKS OF PRESERVATION.

The location and details of these works are given in the Annual Report of the Chief of Engineers for 1895, pages 621 and 622.

The severe storms of the winter of 1898–99 seriously damaged many of the sea walls, making extensive repairs necessary.

During the fiscal year repairs were made to the sea walls at Georges, Long, and Lovells islands, and a section of the riprap at Gallops Island was rebuilt.

At the date of this report repairs are being made to the sea wall at Rainsford Island, and repairs are required to the sea walls on Deer Island and Castle Island. These repairs will be undertaken during the ensuing year.

In addition to these necessary repairs works of preservation are required at points as follows:

At Point Allerton.—The sea wall should be extended westward for a distance of at least 150 feet and the foundation of this extension should be protected with riprap, at an estimated cost of $15,000.

At Georges Island.—The unprotected western shore line of the island, in front of the Government buildings, has been considerably abraded, and it should be protected by a light sea wall, 1,400 feet long, at a cost of $35,000.

At Governors Island.—The shore line of this island has never been protected. The east and south bluffs, however, should be covered by sea walls to prevent additional abrasion, not only to secure the sites of the batteries which occupy these bluffs, but also to prevent injury to the main ship channel.

The east bluff wall should be 500 feet long, and is estimated to cost $30,000; the south bluff wall should be 1,800 feet long, and will cost $50,000.

WORKS OF IMPROVEMENT.

The main ship channel.—Before improvement it had a least width of 100 feet and a least depth of 18 feet at mean low water.

At the present time the main ship channel is being improved under a revised project submitted August 11, 1892. It proposes, in accordance with the act of July 13, 1892, to widen and deepen the channel so that it shall be 1,000 feet wide and 27 feet deep at mean low water. The revised project was estimated to cost $1,250,000.

The original project of improvement of the harbor was submitted in 1867. It proposed to dredge the channel 23 feet deep at mean low water, 1,000 feet wide at the Upper and Lower middles, and 685 feet at the Narrows.

In 1870 the proposed width of the channel at the Narrows was reduced to 625 feet and increased to 1,100 feet at the anchorage shoal in the inner harbor.

Under this project, to the time of the adoption of the project of 1892, the main ship channel had been made 23 feet deep at mean low water, 1,100 feet wide west of the Upper Middle, 850 feet wide at the Upper Middle, 1,000 feet wide at the Lower Middle, and at least 625 feet wide elsewhere.

A list of the positions where dredging and blasting were done in effecting this improvement will be found in the Annual Report of the Chief of Engineers for 1895, page 623.

To complete the project of 1867 the Upper Middle must be widened to 1,000 feet, which work is necessarily included in the project of 1892.

On June 30, 1899, the lower main ship channel had been dredged 1,000 feet wide and 27 feet deep at mean low water, but a section of the channel between Georges and Lovells islands for about 250 feet of its width on the southern side is obstructed by ledges, which must be removed before free use of the full width of channel can be obtained.

Operations were in progress under a continuing contract with Messrs. Breymann Brothers, of Toledo, Ohio, to dredge 2,910,718 cubic yards, more or less, from the main ship channel, in completion of all dredging under the project of August 11, 1892.

This contract was authorized by the river and harbor act of June 3, 1896, and work has been in progress under the contract since October of 1897.

During the fiscal year 875,505 cubic yards of mud, sand, etc., and 20.16 cubic yards of bowlders were dredged, making a total of 2,026,208 cubic yards of mud, sand, etc., and 100.21 cubic yards of bowlders dredged under the contract to date.

At the date of this report the lower main ship channel is in the same condition as on June 30, 1899, and in the upper main ship channel a cut at least 500 feet wide and 27 feet deep at mean low water has been practically completed from President Roads up to the deep-water anchorage at the city wharves, but this cut is obstructed by a ridge of ledges extending across the channel at the Upper Middle.

On May 25, 1900, it was recommended that these ledges be removed, at an estimated cost of $75,900, in order to secure for the benefit of navigation, as soon as possible, the increased depth in the channel. This project was approved May 29, 1900, and on June 14 advertisement was issued calling for proposals for the work, the bids to be received and opened on July 16, 1900.

Appropriations aggregating $455,000 had been made and expended on the project of August 11, 1892, prior to the authorization, by the river and harbor act of June 3, 1896, of continuing contracts for the completion of this project.

On March 12, 1898, it was estimated that to complete the project under continuing contracts would cost $858,750.78.

Appropriations have been made for the work under continuing contracts as follows:

River and harbor act of June 3, 1896:	
Allotted from general appropriation	$45,000
Sundry civil act of—	
June 4, 1897	400,000
July 1, 1898	250,000
March 3, 1899	163,751
Total	858,751

These appropriations aggregate the full amount of the estimated cost.

No further appropriations will be necessary for completion of this project unless unforeseen contingencies shall develop in its execution.

BROAD SOUND CHANNEL.

The river and harbor act of March 3, 1899, in the paragraph appropriating $75,000 for the general improvement of Boston Harbor contains the following proviso:

> *Provided further*, That the Secretary of War may use five thousand dollars thereof and enter into a contract or contracts for such materials and work as may be necessary for the completion of the improvement in accordance with the project recommended in the report printed on pages eight hundred and eighty-seven et sequentes of the Report of the Chief of Engineers for eighteen hundred and ninety-eight; such improvement to provide for a channel one thousand two hundred feet wide and thirty feet deep from the main ship channel in President Roads through Broad Sound Channel, to be paid for as appropriations may from time to time be made by law, not to exceed in the aggregate four hundred and fifty thousand dollars, exclusive of the amount herein and heretofore appropriated.

This project, with plans showing location of the proposed improvement, was published as House Doc. No. 133, Fifty-fifth Congress, second session.

On October 11, 1899, advertisement was issued calling for proposals for dredging in Broad Sound, under the authority above quoted, the bids to be opened November 13, 1899.

On that date but one bid was received, that of Augustus R. Wright, of Portland, Me., at 72 cents per cubic yard. As this price was more than twice the amount of the estimated cost per cubic yard, the proposal was rejected, and the work was readvertised on December 8, 1899.

On January 9, 1900, three bids were opened for the proposed work, and an abstract of them will be found annexed.

But one of these bids, that of G. H. Breymann & Bros., of Toledo, Ohio, at 35 cents per cubic yard, would admit of the work being accomplished within the original estimate of cost, and it was recommended that this bid be accepted. This recommendation was approved by the Secretary of War on February 27, 1900, and on March 13, 1900, a contract was entered into, an abstract of which will be found annexed.

Breymann & Bro.'s bid contained the proviso that work should not be commenced until May 1, 1901, but when the bid was accepted and the contract entered into it was with the understanding that the plant belonging to the contractors and at the time employed on the improvement of the main ship channel under the contract of February 11, 1897, should be operated in Broad Sound during the summer months and commencing July 1, 1900, about in accordance with the following schedule:

On Broad Sound Channel.	On the inner main ship channel.
From July 1, 1900, to Oct. 31, 1900 (4 months).	From Nov. 1, 1900, to Apr. 30, 1901 (6 months).
From May 1, 1901, to Oct. 31, 1901 (6 months).	From Nov. 1, 1901, to Apr. 30, 1902 (6 months).
From May 1, 1902, to June 30, 1902 (2 months).	From July 1, 1902, to Oct. 30, 1902 (4 months).

It was further understood that work in Broad Sound should not be commenced until a channel 27 feet deep at mean low water and 500 feet wide should be opened through the upper main ship channel to the city wharves.

The sundry civil act of June 6, 1900, appropriated $317,000 for the improvement of the Broad Sound Channel, which amount will be sufficient to cover the expenses of all dredging under the contract of March 13, 1900, but the balance of $133,000 of the $450,000 authorized to be expended on this improvement must be appropriated for removal of ledges which will be uncovered by the dredging operations.

At the date of this report the 500 feet width of channel in the upper harbor is practically completed, and dredging in Broad Sound will probably be commenced in July, 1900.

Improvement of subsidiary channels.—The following-named channels have been improved from time to time since 1867, under allotments from the general appropriations for Boston Harbor:

Charles River, Fort Point Channel, Nantasket Beach Channel, channel between Nixs Mate and Long Island, Broad Sound, Jeffries Point Channel, and Chelsea Creek.

Of these, the improvement of Nantasket Beach Channel, Nixs Mate Channel, Broad Sound, and Jeffries Point Channel has been completed, and full information thereof is contained in the Report of the Chief of Engineers, 1895, pages 625–627.

Charles River and Fort Point Channel.—No change has occurred in the condition of either of these channels during the fiscal year. Full information as to their condition will be found in the Report of the Chief of Engineers for 1898, page 868.

Chelsea Creek (or River).—This river flows into the Mystic River from the east, about 1 mile above the navy-yard at Charlestown.

In its original condition about 14 feet at mean high water could be carried in a narrow and tortuous channel difficult of navigation.

The project for the improvement of this tributary channel was submitted December 21, 1894. It proposed to dredge a channel 150 feet wide and 18 feet deep at mean high water to the head of navigation, at an estimated cost of $65,000.

In 1896 the upper part of this channel was dredged 14 feet deep for a width of at least 35 feet, by the expenditure of $7,000 allotted from the appropriaton of $70,000 for Boston Harbor, made by the river and harbor act of June 3, 1896.

This work facilitated to a considerable extent the passage of vessels through the upper part of the channel.

Five thousand dollars was allotted from the appropriation of $75,000 for Boston Harbor, made by the river and harbor act of March 3, 1899, for the continuation of this improvement.

This allotment will be retained in the Treasury until further funds are provided for this work.

To complete the improvement as proposed will require the appropriation of $53,000, all of which could be expended to advantage during the fiscal year ending June 30, 1902.

The act of Congress approved June 6, 1900, "making provision for emergencies in river and harbor works, for certain surveys, and for diversion of certain appropriations or modifications of provisions heretofore made," provided for a survey of "Boston Harbor, with a view to providing channels two thousand feet wide, or such width as may be necessary, and thirty-five feet deep from the navy-yard at Charlestown, and the Chelsea Bridge and Charles River Bridge to President Roads, and from President Roads through Broad Sound Channel to the ocean."

On June 16, 1900, a preliminary report was submitted on this project, in which it was recommended that the survey be made and that $10,000 be allotted from the funds available from appropriations for the general improvement of Boston Harbor to cover the expenses of the survey.

This recommendation was approved and the allotment of $10,000 made under date of June 26, 1900; and at the date of this report preparations are being made to commence the field work of the survey.

Recapitulation of amounts which must be appropriated to complete existing projects.

PRESERVATION.

Extension of Point Allerton sea wall	$15,000
Sea wall for Georges Island	35,000
Sea wall for Governors Island	80,000
	130,000
Less $18,000 from appropriation river and harbor act of June 3, 1896	18,000
Total	112,000

IMPROVEMENT.

Subsidiary channels:	
Completion of Charles River improvement	47,500
Completion of Fort Point Channel	60,000
Completion of Chelsea Creek improvement	53,000
Total	272,500
Broad Sound Channel:	
To complete that section of the project of November 19, 1897, under continuing contracts, as authorized by river and harbor act of March 3, 1899	133,000
Total	405,500

All of this amount could be expended to advantage during the fiscal year ending June 30, 1902.

The several works completed and projected for the improvement of this harbor are located in the collection district of Boston and Charlestown, Mass. Boston is the port of entry.

Money statements.

PROJECT FOR GENERAL IMPROVEMENT.

July 1, 1899, balance unexpended		$118,872.92
June 30, 1900, amount expended during fiscal year	$15,061.76	
June 30, 1900, amount transferred to Broad Sound	5,000.00	
		20,061.76
July 1, 1900, balance unexpended		98,812.16
July 1, 1900, outstanding liabilities		500.00
July 1, 1900, balance available		98,312.16
Amount (estimated) required for completion of existing project		272,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$160,500.00	
For maintenance of improvement	112,000.00	
		272,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

PROJECT OF 1892.

July 1, 1899, balance unexpended		$666,909.79
June 30, 1900, amount expended during fiscal year		157,367.62
July 1, 1900, balance unexpended		509,542.17
July 1, 1900, outstanding liabilities	$43,394.85	
July 1, 1900, amount covered by uncompleted contracts	153,586.25	
		196,981.10
July 1, 1900, balance available		312,561.07

PROJECT FOR BROAD SOUND.

Amount appropriated by sundry civil act approved June 6, 1900	$317,000.00	
June 30, 1900, amount transferred from general improvement	5,000.00	
		$322,000.00
June 30, 1900, amount expended during fiscal year		213.27
July 1, 1900, balance unexpended		321,786.73
July 1, 1900, amount covered by uncompleted contracts		292,628.70
July 1, 1900, balance available		29,158.03
Amount (estimated) required for completion of existing project		133,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		133,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

The dates and amounts of the appropriations for this work are as follows:

Act of—		Act of—	
March 2, 1825	$52,972.56	June 10, 1872	$75,000.00
March 19, 1828	2,000.00	March 3, 1873	150,000.00
May 23, 1828	87,000.00	June 23, 1874	100,000.00
March 2, 1829	7,310.54	March 3, 1875	100,000.00
March 2, 1831	5,000.00	August 14, 1876	50,000.00
March 2, 1831	12,390.00	June 18, 1878	55,000.00
February 24, 1832	9,000.00	March 3, 1879	50,000.00
July 3, 1832	60,000.00	June 14, 1880	75,000.00
July 4, 1836	15,000.00	March 3, 1881	100,000.00
July 7, 1838	7,353.00	August 2, 1882	96,500.00
March 3, 1841	1,000.00	July 5, 1884	5,000.00
March 3, 1841	1,500.00	August 5, 1886	56,250.00
August 31, 1842	2,000.00	August 11, 1888	125,000.00
March 3, 1843	16,000.00	September 19, 1890	145,000.00
July 20, 1848	40,000.00	July 13, 1892	300,000.00
August 30, 1852	30,000.00	August 18, 1894	200,000.00
July 2, 1864	40,000.00	June 3, 1896	70,000.00
July 2, 1864	10,000.00	June 4, 1897 [1]	400,000.00
February 28, 1865	3,000.00	July 1, 1898 [1]	250,000.00
February 28, 1865	20,000.00	March 3, 1899	75,000.00
June 12, 1866	50,000.00	March 3, 1899 [1]	163,751.00
July 12, 1866	75,000.00	June 6, 1900	317,000.00
March 2, 1867	375,000.00		
July 11, 1870	100,000.00	Total	4,080,027.10
March 3, 1871	100,000.00		

Abstract of proposals for dredging in Boston Harbor, Massachusetts, opened January 28, 1897, by Lieut. Col. S. M. Mansfield, Corps of Engineers.

No.	Name and address of bidder.	Price bid— Per cubic yard, measured in scows.	Price bid— For removing bowlders weighing over 6 tons each, per cubic yard.	Total.
		Cents.		
1	Charles H. Souther and Augustus R. Wright, Boston, Mass.	21⅞	$5.00	$636,719.56
2	American Dredging Co., by L. Y. Schermerhorn, president, Philadelphia, Pa.	29	15.00	844,108.22
3	Alabama Dredging and Jetty Co., by E. L. Merkel, president, Mobile, Ala.	40	8.00	1,164,287.20
4	Perkins, White & Co., and John J. O'Brien & Co., Boston, Mass.	28½	10.00	829,554.63
5	Baltimore Dredging Co., by F. A. Furst, president, Baltimore, Md. *a*	27½	(*a*)	800,447.45
6	John B. and Eugene Breymann, Toledo, Ohio *b*	17½	12.00	509,375.65
7	Morris & Cumings Dredge Co., by George Leary, president, New York, N. Y.	26½	....	771,340.27

a Informal. *b* Lowest bid.

The contract was awarded to Breymann Brothers, with the approval of the Chief of Engineers.

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[1] Sundry civil act.

Abstract of proposals for dredging in Broad Sound, Boston Harbor, Massachusetts, opened November 13, 1899, by Col. Charles R. Suter, Corps of Engineers.

No.	Name and address of bidder.	Price bid— Per cubic yard, measured in scows.	Price bid— For removing bowlders weighing over 6 tons each, per cubic yard.	Total.
1	Augustus R. Wright, Portland, Me	$0.72	$25.00	$601,979.04

The bid received was considered excessive and rejected.

Abstract of proposals for dredging in Broad Sound, Boston Harbor, Massachusetts, opened January 9, 1900, by direction of Col. Charles R. Suter, Corps of Engineers, by First Lieut. Charles S. Bromwell, Corps of Engineers.

No.	Name and address of bidder.	Price bid— Per cubic yard, measured in scows.	Price bid— For removing bowlders weighing over 6 tons each, per cubic yard.	Total.
1	Eastern Dredging Co., Boston, Mass	$0.72	$25.00	$601,979.04
2	Atlantic Dredging Co., New York, N. Y	.80	15.00	668,865.60
3	G. H. Breymann & Bros., Toledo, Ohio [a]	.35	24.00	292,628.70

[a] Lowest bid. Will not commence work before May 1, 1901.

The contract was awarded to G. H. Breymann & Bros., with the approval of the Chief of Engineers, February 27, 1900, by waiving informality in the bid.

LIST OF CONTRACTS IN FORCE JUNE 30, 1900.

Contract dated February 11, 1897: Breymann Bros., Toledo, Ohio, contractors, to dredge 2,910,718 cubic yards, more or less, of material from the main ship channel, Boston Harbor, Massachusetts, at 17½ cents per cubic yard; approved March 9, 1897; to be commenced April 1, 1897; to be completed June 30, 1900; time of completion extended to October 30, 1902, on February 27, 1900.

Contract dated March 13, 1900: Breymann Bros., of Toledo, Ohio, contractors; to dredge 836,082 cubic yards, more or less, of material from Broad Sound Channel, Boston Harbor, Massachusetts, at 35 cents per cubic yard; approved March 31, 1900; to be commenced July 1, 1900; to be completed June 30, 1902.

COMMERCIAL STATISTICS.

The accompanying commercial statistics for the fiscal year ending June 30, 1900, have been furnished by the collector of customs at Boston, Mass.

Amount of revenue collected:

1898	$10,678,299.95
1899	15,689,276.26
1900	18,871,848.99

COMMERCIAL STATISTICS—continued.

Shipping.	1898.		1899.		1900.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.
Entrances:						
Foreign	1,780	1,772,088	1,587	1,989,784	1,643	2,016,121
Domestic	212	188,402	193	140,011	217	219,473
Clearances:						
Foreign	1,673	1,541,315	1,426	1,710,822	1,504	1,660,587
Domestic	244	120,557	281	161,926	305	248,095

	1898.	1899.	1900.
Importations:			
Merchandise	$51,475,094	$52,101,069	$72,161,687
Coin and bullion	653,740	114,185	184,602
Exportations:			
Foreign—			
Merchandise	1,402,676	2,437,731	1,243,486
Coin and bullion	....	2,904	3,384
Domestic—			
Merchandise	116,129,227	125,600,258	110,946,023
Coin and bullion	8,100	19,505	22,500

C 5.

IMPROVEMENT OF TOWN RIVER, MASSACHUSETTS.

Town River is a small tidal river tributary to Weymouth River, which empties into Boston Harbor on the south.

The wharves of the city of Quincy are about 1½ miles above its mouth.

The upper half of the river has a narrow, crooked channel, in which but 1½ feet of water can be carried at mean low water.

The project for its improvement submitted December 31, 1890, proposed to dredge a channel 4,500 feet long, 100 feet wide, and 4 feet deep at mean low water to the head of navigation, at an estimated cost of $20,000.

On March 24, 1897, the estimate of cost of the project of improvement was revised, in accordance with Department letter dated August 7, 1896, and increased to $25,000. (Annual Report, 1897, p. 848.)

The total appropriations to date have been $18,000.

The expenditures to June 30, 1899, were $9,757.43.

At that date the channel had been dredged 4 feet deep at mean low water, 50 feet wide up to Johnson's wharf, a distance of 3,500 feet, and 30 feet wide for a further distance of 800 feet.

The river and harbor act of March 3, 1899, appropriated $8,000 for continuing the improvement of this river, and on March 17, 1899, a project for expenditure of this appropriation was approved. On June 27, 1899, bids for the proposed dredging were received and opened.

On July 12, 1899, a contract was entered into with Mr. Joseph E. White, of Quincy, Mass., to dredge 28,000 cubic yards, more or less, of material from the channel.

Work under this contract was commenced August 7, 1899, and was completed November 10, 1899. A total of 30,007 cubic yards was dredged under the contract, and at the date of this report the channel has been dredged 4 feet deep at mean low water 50 feet wide for a distance of 1,000 feet below the upper end, 100 feet wide for a further distance of 2,200 feet, and 50 feet wide for the remaining length at its lower end.

In June, 1900, an examination was made of the channel, which shows that shoaling has taken place over the area dredged under former appropriations, and that at the present date the greatest continuous depth through the channel is 2.5 feet at mean low water.

To complete the improvement will require an appropriation of $7,000, all of which could be expended during the fiscal year ending June 30, 1901.

Town River, Massachusetts, is in the collection district of Boston, Mass., of which Boston is the port of entry. The nearest light-house is on Long Island, Boston Harbor, Massachusetts.

The local commerce consists of coal, lumber, etc., and the output of the Quincy granite quarries.

The value of this commerce annually will approximate $200,000.

Money statement.

July 1, 1899, balance unexpended	$8,242.57
June 30, 1900, amount expended during fiscal year	7,966.02
July 1, 1900, balance unexpended	276.55
Amount (estimated) required for completion of existing project	7,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	7,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

The dates and amounts of appropriations for this work are as follows:

Act of June 3, 1896	$10,000.00
Act of March 3, 1899	8,000.00
Total	18,000.00

Commercial statistics are included in the statement for Boston Harbor, Massachusetts.

C 6.

IMPROVEMENT OF WEYMOUTH RIVER, MASSACHUSETTS.

Weymouth (Fore) River empties into the southwestern part of Boston Harbor, Massachusetts. For 4 miles it was navigable at low water for vessels drawing 18 feet, and to the head of navigation, an additional 3 miles, at least 3 feet depth was to be found.

The original project for its improvement was submitted December 2, 1889. It proposed to improve the natural channel so that 6 feet at mean low water could be carried to the head of navigation in a channel 100 feet wide to near Weymouth Landing, thence to the Braintree Bridge 80 feet wide, and above the bridge 50 feet wide, the total length of improved channel to be 7,000 feet and to cost $40,000.

The total appropriations to date have been $50,000, of which $12,500 must be expended on the "Back" River.

The expenditures to June 30, 1899, were $26,749.42 on Fore River. At that date the improved channel had been dredged 6 feet deep and 60 feet wide up to Braintree Bridge, and was completed above the bridge, excepting over four small ledges uncovered by the dredging in 1897.

The river and harbor act of March 3, 1899, appropriated $10,000 for continuing the improvement of Weymouth (Fore) River.

On July 12, 1899, a contract was entered into with Mr. Joseph E. White to dredge 30,000 cubic yards, more or less, of material, at 27 cents per cubic yard, from the channel. This contract was approved by the Chief of Engineers July 26, 1899, and under it work was to be commenced by October 1, 1899, and be completed by December 31, 1899. The date of completion was later extended to June 15, 1900.

Work under the contract was commenced November 11, 1899, and was completed June 14, 1900. A total of 34,789 cubic yards of material were dredged under the contract, and at the date of this report the channel has been dredged 6 feet deep at mean low water, of full projected width, for a distance of 3,600 feet from its lower end, 60 feet wide for a further distance of 1,500 feet, and of full projected width for the remaining length of channel.

This work is subject to deterioration by reason of the deposit of silt, etc., from the mud flats which border the channel, and at present the greatest continuous depth which can be carried in the improved channel is about 5 feet at mean low water.

Weymouth (Back) River lies east of the Fore River and forms the boundary between the towns of Weymouth and Hingham. It empties into Boston Harbor at the mouth of Fore River.

Originally 6 feet at mean low water could be carried to the wharf of the Bradley Fertilizer Company, a distance of 7,000 feet. For a further distance of about 8,800 feet a channel exists navigable only at high water.

The project for the improvement of Weymouth (Back) River was submitted February 7, 1891. It proposed to dredge a channel through the outer bar 200 feet wide and 12 feet deep at mean low water, and to widen and deepen the natural channel of the river to the same dimensions to the wharf of the fertilizer company, at an estimated cost of $22,000.

On March 15, 1897, a project for the further improvement of this river was submitted. It proposed to dredge a channel 60 feet wide and 4 feet deep at mean low water from the wharf of the Bradley Fertilizer Company up to Mann's wharf, at an estimated cost of $49,834.01. (House Doc. No. 12, Fifty-fifth Congress, first session.) (Annual Report, 1897, p. 874.)

No appropriations have as yet been made for the execution of this project.

The appropriations to date have been $12,500.

The expenditures to June 30, 1899, were $11,704.19.

At that date the channel had been dredged 12 feet deep at mean low water, 200 feet wide through the outer bar, and 125 feet wide thence to the fertilizer company wharf.

No operations have been in progress during the fiscal year, and at the date of this report the condition of the improvement is the same as on June 30, 1899.

The amount required to complete the improvement of Weymouth (Fore) River is $2,500; to complete Weymouth (Back) River, project of 1891, $9,500; total, $12,000.

Weymouth River is in the collection district of Boston, Mass., of which Boston is the port of entry. The nearest light-house is on Long Island, Boston Harbor, Massachusetts.

Money statement.

July 1, 1899, balance unexpended	$11,546.39
June 30, 1900, amount expended during fiscal year	10,622.99
July 1, 1900, balance unexpended	923.40
Amount (estimated) required for completion of existing project	12,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	12,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

The dates and amounts of the appropriations for this work are as follows:

Act of—	
September 19, 1890	$10,000
July 13, 1892	10,000
August 18, 1894	5,000
June 3, 1896	15,000
March 3, 1899	10,000
Total	50,000

Commercial statistics are included in the statement for Boston Harbor, Massachusetts.

The character of commerce benefited by the improvement of this river is the supply of coal, lumber, and general merchandise to the populous district surrounding it. The annual value of this commerce approximates $750,000.

C 7.

IMPROVEMENT OF HARBOR AT SCITUATE, MASSACHUSETTS.

Scituate Harbor is on the west shore of Massachusetts Bay, 14 miles from either Boston or Plymouth light-houses and just southwest of the direct sailing course of all ocean-going vessels entering Boston Harbor.

Before improvement the harbor had a low-water area of 57 acres, approximately, more than 6 acres of which had a depth of at least 3 feet at mean low water. It was entirely open to the action of east winds and the entrance was obstructed by many sunken bowlders. The depth on the bar was about 2½ feet at mean low water. The mean rise or fall of the tide is 9.8 feet.

The object of the improvement is to create a harbor of refuge for vessels bound to Boston, which are too far south of their course to clear the dangerous ledges near Minots Light-House.

The project of improvement, adopted in 1881, is to build two rubblestone breakwaters converging from opposite shores and to dredge an anchorage basin connecting with the sea and the town wharves. The anchorage basin is to be 30 acres in area, approximately. The entrance channel is to be 2,700 feet long and 300 feet average width. The depths proposed were 15 feet in the entrance channel, 12 to 15 feet between the breakwaters, 12 feet immediately in the rear of the south breakwater, and 10 feet for the anchorage basin. The channel leading to the town wharves is to be 3 feet deep, all at mean low water.

The estimated cost of the breakwaters was $100,000, and of dredging $190,000, a total of $290,000.

The plan of the harbor, showing the proposed improvement, was published in the Annual Report of the Chief of Engineers for 1881, Part I, page 522.

The total amount appropriated for this work to date is $104,680, of which $1,180 was expended before the present project was adopted.

The amount expended to June 30, 1899, was $88,410.24.

At that date the condition of the improvement was as follows:

A portion of the beach between Cedar Point and the mainland was protected by a brush and stone bulkhead 450 feet long, in front of which was a stone apron 10 feet wide, 385 feet long.

All known bowlders obstructing the entrance of the harbor were removed.

The anchorage basin was 400 by 350 feet in area and 7 feet deep at mean low water.

The entrance channel had been dredged 1,600 feet long, 100 feet wide, and 7 feet deep at mean low water. The channel connecting the basin with the town wharves had been dredged 3 feet deep at mean low water and 400 feet wide, except at the upper end, where, for a distance of 75 feet, it averaged only 50 feet wide.

The north breakwater was 720 feet long; the south breakwater 450 feet long.

The river and harbor act of March 3, 1899, appropriated $15,000 for Scituate Harbor, for maintenance and repair.

A survey of the improvement made in April, 1899, showed that the channel from the anchorage basin has shoaled and needed redredging, and on June 20, 1899, a project for redredging this channel at a cost of $7,500 was approved.

On October 5, 1899, a contract was entered into with Charles H. Souther, of Boston, Mass., to dredge 35,000 cubic yards, more or less, of material from the harbor. This contract was approved October 17, 1899, and under it work was to be commenced by October 20, 1899, and completed by December 31, 1899.

Work under the contract was commenced October 24, 1899, and was completed December 13, 1899; 34,814 cubic yards of material were dredged, and the channel approach to the town wharves was made 3 feet deep at mean low water, at least 100 feet wide throughout, 200 feet wide for a distance of 1,200 feet, and 250 feet wide at the point of departure from the anchorage basin.

No work was done on other parts of the project during the fiscal year, and at the date of this report they are in the same condition as on June 30, 1899.

Scituate Harbor is in the collection district of Plymouth, Mass.

Money statement.

July 1, 1899, balance unexpended	$15,089.76
June 30, 1900, amount expended during fiscal year	12,952.59
July 1, 1900, balance unexpended	2,137.17
Amount (estimated) required for completion of existing project	186,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	30,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

The dates and amounts of the appropriations for this work are as follows:

Act of—		Act of—	
March 2, 1829	$180	September 19, 1890	$10,000
August 30, 1852	1,000	July 13, 1892	10,000
June 14, 1880	7,500	August 18, 1894	10,000
March 3, 1881	10,000	June 3, 1896	6,000
August 2, 1882	10,000	March 3, 1899	15,000
July 5, 1884	10,000		
August 5, 1886	10,000	Total	104,680
August 11, 1888	5,000		

No contracts are in force at the date of this report.

Abstract of proposals for dredging in Scituate Harbor, Massachusetts, opened September 23, 1899, by direction of Col. Charles R. Suter, Corps of Engineers, by First Lieut. Charles S. Bromwell, Corps of Engineers.

No.	Name and address of bidder.	Price bid per cubic yard— For dredging.	Price bid per cubic yard— For removal of bowlders over 3 tons each.	Total yards that can be dredged.
		Cents.		
1	Chas. H. Souther, Boston, Mass. [a]	34$\frac{4}{16}$	$5.00	36,627
2	Augustus B. Martin, Boston, Mass	37	5.00	34,054
3	Eastern Dredging Co., Boston, Mass	30	5.00	42,000
4	Alonzo E. Smith, New York, N. Y	29⅛	15.00	42,711
5	John P. Randerson, Albany, N. Y	29⅛	11.50	42,711

[a] Lowest bid complying with all the terms of the specifications.

The contract was awarded to Charles H. Souther, with the approval of the Chief of Engineers.

COMMERCIAL STATISTICS.

The accompanying commercial statistics have been furnished by the collector of customs at Plymouth, Mass.:

Amount of revenue collected:

1899	$450.00
1900	1,224.88

Shipping.	1898.	1899.	1900.
Entrances:			
Foreign	3	2	6
Domestic	25	16	....
Clearances:			
Foreign	3	2	6
Domestic	25	16	....

Imports.	1898.	1899.	1900.
Coal ... tons	3,500	3,500	3,500
Lumber ... feet	2,000,000	2,000,000	1,250,000
Lime and cement ... barrels	....	1,500	1,900
Brick ... number	500,000	250,000	400,000

Vessels frequenting the harbor are schooners and barges; draft of water, 10 to 12 feet, the limit in depth to the wharves.

C 8.

IMPROVEMENT OF DUXBURY HARBOR, MASSACHUSETTS.

Duxbury Bay, Massachusetts, is the northerly of three divisions into which Plymouth Harbor is divided.

The town of Duxbury covers part of Kingston Bay, another of these divisions, and in 1872–1874 $20,000 was expended by the National Government in improving the Miles or South Channel, extending westward from the "cow yard" by the south point of Captains Hill.

The present approved project for the improvement of Duxbury Harbor, Massachusetts, was submitted November 8, 1886, and proposes to dredge the western branch of the Duxbury Channel to a least width of 60 feet and a depth of 6 feet at mean low water up to the town landing.

The length of channel to be dredged under this project is about 3,600 feet, and the estimated cost was $13,200.

The total appropriations to date for the current project are $12,000.

The expenditures to June 30, 1899, were $336.60.

At that date no work had been done on the project.

The river and harbor act of March 3, 1899, appropriated $12,000 for improving this harbor and for repairs made necessary by storms.

On March 25, 1899, it was recommended that $650 of this appropriation be expended in making an examination of the channel and the beach, in order that the most advantageous application of the available funds might be determined.

This project was approved April 1, 1899, and in May and June the survey was made.

On July 31, 1899, a project, accompanied by a map of the harbor based on the survey, was submitted, together with a revised estimate, increasing the cost of the improvement to $17,820.

It was found desirable to relocate the proposed channel to meet altered conditions since the project of November 8, 1886, was submitted. The channel is to be 6 feet deep at mean low water, 60 feet wide in the straight section, with the width increased to 100 feet in the curved section.

It was also recommended that the available funds be expended in dredging a channel within the limits of the proposed improvement 6 feet deep at mean low water, 40 feet wide in the straight section, and 60 feet wide on the curve.

This project was approved on August 12, 1899, and on October 19, 1899, a contract was entered into with Augustus B. Martin, of Boston, Mass., to dredge 44,000 cubic yards of material at 23½ cents per yard.

This contract was approved November 2, 1899, and under it work was to be commenced on or before November 18, 1899, and completed by June 30, 1900.

Work under this contract was commenced on November 1, 1899, and was completed June 16, 1900. Forty-three thousand nine hundred and twenty-eight cubic yards of material were dredged, resulting in securing a channel to the principal wharf with a depth of at least 6 feet at mean low water, 40 feet wide in the straight section, 60 feet wide on the curve, and 80 feet wide in the immediate vicinity of the wharf.

The amount necessary to complete this improvement is $5,820, all of which could be expended to advantage during the fiscal year ending June 30, 1902.

Duxbury Harbor is in the collection district of Plymouth, Mass., of which Plymouth is the port of entry. The nearest light-house is Duxbury Pier Light, about 3 miles distant.

Money statement.

July 1, 1899, balance unexpended	$11,663.40
June 30, 1900, amount expended during fiscal year	11,567.14
July 1, 1900, balance unexpended	96.26
Amount (estimated) required for completion of existing project	5,820.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	5,820.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

The dates and amounts of appropriations for this harbor since 1872 are as follows:

June 10, 1872	[1] $10,000.00
March 3, 1873	[1] 10,000.00
March 3, 1899	12,000.00
Total	32,000.00

No contracts are in force at the date of this report.

Abstract of proposals for dredging in Duxbury Harbor, Massachusetts, opened October 6, 1899, by Col. Chas. R. Suter, Corps of Engineers.

No.	Name and address of bidder.	Price bid per cubic yard—		Total that can be dredged.
		For dredging.	For removal of bowlders over 3 tons each.	
		Cents.		*Yards.*
1	Augustus B. Martin, Boston, Mass. *a*	23.5	$5.00	44,042
2	Alonzo E. Smith, New York, N. Y	35	15.00	29,571
3	Eastern Dredging Co., Boston, Mass	27.5	5.00	37,636
4	Hartford Dredging Co., Hartford, Conn	36.7	4.97	28,201
5	John P. Randerson, Albany, N. Y	24	5.00	43,125

a Lowest bid.

The contract was awarded to Augustus B. Martin, with the approval of the Chief of Engineers.

C 9.

IMPROVEMENT OF HARBOR AT PLYMOUTH, MASSACHUSETTS.

Plymouth Harbor is situated 30 miles south of Boston. Its outer anchorage, the "cow yard," is common to Plymouth, Kingston, and Duxbury, and is the only refuge for seagoing vessels from northeasterly gales when caught between Boston and Provincetown, a distance of about 75 miles, following the coast line. The entrance to this outer anchorage is direct, unobstructed, of ample width, and sufficiently deep for the wants of commerce. The anchorage is capacious and has good "holding ground," but the extensive tidal basins inside of it give strong variable currents across it.

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[1] Expended in 1872–1874 in improving the Miles or South Channel.

The inner or harbor proper is formed by Long Beach, a narrow, low sand spit 3 miles long, which extends generally parallel to the mainland and about 1 mile from it.

The harbor contains about 2,000 acres, almost all of which is dry at low tide. A few narrow, crooked channels traverse these flats. They join about the center of the harbor, opposite the town wharves, and form the main ship channel (150 feet wide, approximately, and 10 feet deep at mean low water), which runs directly behind the northern half of Long Beach to the outer anchorage.

The maintenance of this inner harbor or channel depends on the preservation of Long Beach.

A chart of the harbor was published in the Annual Report of the Chief of Engineers for the year 1888, Part I, page 460.

Before improvement about 6 inches depth of water could be carried to the town wharves at low tide.

Previous to 1875 the project was a general one, and had for its object the preservation of Long Beach. From the nature of the work it can at no time be considered completed, and small annual appropriations are necessary to repair any damage done by storms. The various devices employed for this purpose are described in the Annual Report of the Chief of Engineers for 1877.

The project for the improvement of the harbor was first adopted in 1875. It provided for dredging a channel from the town wharves to the main ship channel 2,286 feet long, 100 feet wide, and 6 feet deep at mean low water. This project was modified in 1877 so as to include the dredging of a basin 866 feet long, 150 feet wide, and 8 feet deep directly in front of the town wharves.

In 1884 and 1885 it was proposed to deepen the channel and basin to 9 feet at mean low water and to make the channel 150 feet wide.

The modified project of 1884 required the excavation of 81,000 cubic yards (scow measurement), and was originally estimated to cost $27,000. This estimate was revised in 1885 in accordance with the low prices then current for dredging, and the cost was then estimated to be $22,500.

The river and harbor act of June 3, 1896, ordered a survey to be made and project submitted for further improvement of the harbor, and on April 24, 1897, a plan and project for improvement were submitted, the estimated cost of which was $8,716.95.

This report and project were published as House Doc. No. 39, Fifty-fifth Congress, first session; also Annual Report, Chief of Engineers, 1897, page 877.

From 1824 to date the amount appropriated for this harbor is $267,-766.90, of which there has been expended to June 30, 1899—

For beach protection	$129,526.29
For dredging	50,738.10
Total	180,264.39

On June 30, 1899, the project of 1884–85 for improvement had been completed. No appropriation had been made for work under the project of improvement dated April 24, 1897.

The severe storms of the winter of 1898-99 seriously damaged the beach, sweeping all protective works from it for a length of about 12,000 feet and cutting down the crest to a level of about 2 feet above mean high water. Eel River was also turned from its former course in the inner harbor and made to discharge directly into the sea through the beach at the southern end.

On January 20, 1899, a report on the condition of the beach was submitted in accordance with Department letter of January 14, 1899, in which it was estimated that the cost of the necessary repairs would be $95,700.

The river and harbor act of March 3, 1899, appropriated $75,000 for repair of storm damages to the beach, in accordance with this report, and on May 20, 1899, a project for the expenditure of this appropriation was submitted, proposing to protect the beach with a rubblestone riprap for as great a length as the funds available would purchase.

This project was approved by the Secretary of War on June 5, 1899. On June 27, 1899, advertisement was issued calling for proposals for construction of the riprap, and on July 29, 1899, bids were received and opened. An abstract of the bids will be found annexed.

On August 18, 1899, a contract was entered into with Bell & Co., of Boston, Mass., to deposit 45,000 tons of stone in the riprap on Long Beach.

This contract was approved September 15, 1899, and under it work was to be commenced on or before October 1, 1899, and was to be completed by October 31, 1900.

During the fiscal year about 550 feet of riprap was constructed under this contract.

A survey of the dredged channel and basin, made in May, 1899, showed that both channel and basin had shoaled so as to seriously impair the utility of the improvement.

The river and harbor act of March 3, 1899, appropriated $10,000 for maintenance, and on May 25, 1899, it was recommended that this appropriation be expended in redredging the channel and basin. This recommendation was approved on May 27, 1899. On June 20, 1899, advertisement was issued calling for bids for the proposed dredging, and on July 21, 1899, five bids were received and opened. An abstract of these bids will be found annexed.

On August 15, 1899, a contract was entered into with the Hartford Dredging Company, of Hartford, Conn., to dredge 45,000 cubic yards, more or less, of mud from the channel and basin.

This contract was approved October 7, 1899, and under it work was to be commenced on or before October 25, 1899, and was to be completed by January 9, 1900.

Work under this contract was commenced November 10, 1899, and was completed February 8, 1900. A total of 44,232 cubic yards of material was dredged, and the channel and basin were restored to full projected depth of 9 feet and a least width of 150 feet.

At the date of this report Long Beach is in poor condition, and construction of protective works will be continued during the ensuing year, so far as the available funds will admit, but the full amount of the estimate of January 20, 1899, will be required to fully repair the storm damages, and could be expended to advantage during the fiscal year ending June 30, 1902.

Plymouth Harbor is in the collection district of Plymouth, Mass., of which Plymouth is the port of entry. The nearest light-houses are the Plymouth (Gurnet) Lights, about 5 miles from Plymouth, and Duxbury Pier Light, about 2 miles distant.

Money statement.

July 1, 1899, balance unexpended		$87,502.51
June 30, 1900, amount expended during fiscal year		16,212.33
July 1, 1900, balance unexpended		71,290.18
July 1, 1900, outstanding liabilities	$886.52	
July 1, 1900, amount covered by uncompleted contracts	56,371.39	
		57,257.91
July 1, 1900, balance available		14,032.27
Amount (estimated) required for completion of existing project		20,700.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		20,700.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

The dates and amounts of appropriations for this harbor are as follows:

Act of—	
May 26, 1824	$20,000.00
March 3, 1825	5,712.00
March 25, 1826	13,184.90
April 23, 1830	1,850.00
March 2, 1831	2,820.00
July 3, 1832	2,500.00
March 2, 1833	600.00
June 28, 1834	2,000.00
March 3, 1835	700.00
July 2, 1836	500.00
July 7, 1838	2,400.00
August 31, 1852	5,000.00
July 11, 1870	10,000.00
March 3, 1871	10,000.00
June 10, 1872	2,500.00
March 3, 1873	3,000.00
June 23, 1874	5,000.00

Act of—	
March 3, 1875	$10,000.00
June 18, 1878	5,000.00
March 3, 1879	3,500.00
June 14, 1880	10,000.00
March 3, 1881	10,000.00
August 2, 1882	14,000.00
July 5, 1884	10,000.00
August 5, 1886	6,000.00
August 11, 1888	6,000.00
September 19, 1890	8,000.00
July 13, 1892	9,500.00
August 18, 1894	1,500.00
June 3, 1896	1,500.00
March 3, 1899	10,000.00 75,000.00
Total	267,766.90

Abstract of proposals for dredging in Plymouth Harbor, Massachusetts, opened July 21, 1899, by Col. Chas. R. Suter, Corps of Engineers.

No.	Name and address of bidder.	Price bid per cubic yard— For dredging.	Price bid per cubic yard— For removal of bowlders over 3 tons each.	Total that can be dredged.
		Cents.		*Yards.*
1	Alonzo E. Smith, New York, N. Y	24½	$15.00	36,734
2	The Hartford Dredging Co., Hartford, Conn. *a*	20		45,000
3	Chas. H. Souther, Boston, Mass	25	5.00	36,000
4	Augustus B. Martin, Boston, Mass	32½	5.00	27,692
5	Eastern Dredging Co., Boston, Mass	28¾	5.00	31,306

a Lowest bid.

The contract was awarded to The Hartford Dredging Company, with the approval of the Chief of Engineers.

Abstract of proposals for construction of rubblestone riprap on Long Beach, Plymouth Harbor, Massachusetts, opened July 29, 1899, by Col. Chas. R. Suter, Corps of Engineers.

No.	Name and address of bidder.	Price per ton of 2,000 pounds.	Total.
			Tons.
1	Dexter H. Craig, Plymouth, Mass	$1.47 1.75	41,326 34,714
2	John P. Conkling, New York, N. Y	2.10	28,928
3	Pigeon Hill Granite Co., Rockport, Mass	1.73	35,115
4	Rockport Granite Co., Rockport, Mass	1.93	31,476
5	Saml. F. Randolph, New York, N. Y	1.449	41,925
6	Bell & Co., Boston, Mass. *a*	1.33	45,676

a Lowest bid.

The contract was awarded to Bell & Co., with the approval of the Chief of Engineers.

ABSTRACT OF CONTRACT IN FORCE JUNE 30, 1900.

Contract dated August 18, 1899; Bell & Co., Boston, Mass., contractors; to deposit 45,000 tons, more or less, of rubblestone in the riprap at $1.33 per ton; approved September 15, 1899; to be commenced October 1, 1899; to be completed October 31, 1900.

COMMERCIAL STATISTICS.

The accompanying commercial statistics have been furnished by the collector of customs at Plymouth, Mass.

Amount of revenue collected:

1898	$2,887.21
1899	10,678.00
1900	603.91

Shipping.	1898.	1899.	1900.
Entrances:			
Foreign	1	5	4
Domestic	73	61	73
Clearances:			
Foreign	3	7	6
Domestic	71	61	71

Imported.		1898.	1899.	1900
Coal	tons	23,521	20,001	23,649
Lumber	feet	2,400,000	3,080,000	3,015,000
Miscellaneous	tons	130		
Brick	number			600,000

Barges and schooners up to 18 feet draft frequent the harbor.

C 10.

IMPROVEMENT OF HARBOR AT PROVINCETOWN, MASSACHUSETTS.

Provincetown Harbor is situated at the extremity of Cape Cod, about 40 miles southeast from Boston Light. It is one of the most valuable harbors of refuge on the Atlantic coast. The entire commerce of New England and a very large local fishing interest are directly benefited by its maintenance, which depends entirely on the preservation of the sandy beaches which inclose it.

Since 1826 the project has been a general one, and provides for the preservation of the harbor by building dikes, bulkheads, and sand catches, and extensive planting of beach grass to repair or prevent storm damages to the beaches. From the nature of the work it can at no time be considered completed.

A full history of the improvement will be found in the Annual Report of the Chief of Engineers for the years 1876, 1879, and 1886. A special dike across House Point Island Flats, to be built contingently, was recommended in the Annual Report for 1886.

A plan and report of a survey of the harbor, made in October, 1896, was published as House Doc. No. 8, Fifty-fifth Congress, first session.

This report recommended the protection of the beach on the harbor side, in the vicinity of Wood End Light, by means of a stone riprap, estimated to cost $13,200.

The total appropriations for this harbor to date are $165,918.44.

The amount expended to June 30, 1899, was $150,433.15.

The condition of the several works of preservation in this harbor on June 30, 1899, was as follows:

Long Point.—This long, narrow, low point forms the southeastern limit of the harbor. Works of preservation have been built at its northeastern end, protecting the Long Point light-house reservation at a point near the Wood End Light where the beach is exceedingly narrow and low, and at its northwestern end near Abel Hill. These works of protection were in good order.

Wood End.—The existing works, consisting of wooden bulkheads, were in good order, but required extension.

Abel Hill Dike.—This dike was built to prevent a rush of water from Lanceys Harbor over House Point Island Flats into the main harbor. The rapid wearing away of the southern sand spit that formed Lanceys Harbor had threatened to make a breach through the beach south of the dike. To guard against this brush and wooden sand catches have been built on the outer beach opposite the west end of the dike. The dike was in fair order, but required minor repairs.

House Point Island Flats.—These flats remained essentially unaltered. It still appears unnecessary to commence the dike projected to be built across these flats.

Beach Point, High Head Dike, and Cove Section.—These works were all in good order.

During the fiscal year 1,409 running feet of bulkhead were added to the protective works at Wood End and 400 feet of old bulkhead were repaired, and at Abel Hill 108 feet of new bulkhead were built and 105 feet of old bulkhead repaired.

Extension of the protective works at Wood End Light is proposed during the present season, and it may be desirable to further strengthen the works at Long Point.

The nature of the works of preservation of the harbor requires a small sum to be always available for immediate repairs.

Such necessary repairs have averaged $1,500 per annum.

The funds on hand are sufficient to cover all prospective emergency repairs for the fiscal year ending June 30, 1902, but the section of beach at Wood End should be protected by the stone bulkhead recommended in the report of October, 1896, and which can not be done until sufficient funds are appropriated for that purpose.

The prospective benefit to commerce is the preservation of an important harbor of refuge.

Provincetown is a port of entry in the collection district of Barnstable, Mass. The nearest light-houses are Wood End and Long Point lights.

Money statement.

July 1, 1899, balance unexpended	$15,485.29
June 30, 1900, amount expended during fiscal year	3,669.75
July 1, 1900, balance unexpended	11,815.54

The dates and amounts of the appropriations for this work are as follows:

Act of—	
May 19, 1826	$3,500.00
March 2, 1829	3,500.00
March 2, 1831	2,050.00
March 3, 1832	4,600.00
June 28, 1834	4,400.00
March 3, 1835	4,400.00
July 2, 1836	4,400.00
July 7, 1838	4,500.00
August 30, 1852	5,000.00
June 23, 1866	43,068.44
July 28, 1866	8,000.00
March 3, 1871	6,000.00
June 10, 1872	5,000.00
March 3, 1873	6,000.00
June 23, 1874	6,000.00
March 3, 1875	5,000.00

Act of—	
August 14, 1876	$4,000.00
June 18, 1878	1,000.00
March 3, 1879	1,000.00
June 14, 1880	500.00
March 3, 1881	5,000.00
August 2, 1882	5,000.00
July 5, 1884	2,000.00
August 5, 1886	3,000.00
August 11, 1888	3,000.00
September 19, 1890	7,500.00
July 13, 1892	1,500.00
August 18, 1894	1,500.00
June 3, 1896	1,500.00
March 3, 1899	10,000.00
Total	165,918.44

COMMERCIAL STATISTICS.

The accompanying commercial statistics have been furnished by the collector of customs at Barnstable, Mass.

Amount of revenue collected:

1898	$1,439.28
1899	285.13
1900	1,701.95

Shipping.	1898.		1899.		1900.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.
Entrances:						
Foreign	23	3,450	20	5,000	14	7,000
Domestic			10	1,000	16	800
Clearances:						
Foreign	15	2,250	10	500	9	1,300
Domestic			7	800	10	2,000

Imported.	1898.	1899.	1900.
Coal ... tons..	6,000	7,000	7,500
Salt ... do...	250	9,000	600
Lumber ... feet..	1,500,000	1,500,000	1,500,000
Merchandise ... tons..	3,000	3,000	5,000
Miscellaneous ... do...	13,000	800	6,000

All classes and nationalities of vessels visit the harbor for shelter or with cargo.

The estimated value of vessels which enter the harbor during the year is $40,000,000.

The Boston, Plymouth and Provincetown Steamboat Company line was established during the year.

C II.

IMPROVEMENT OF HARBOR AT CHATHAM, MASSACHUSETTS.

Chatham Harbor is at the eastern end of Nantucket Sound, about 15 miles east of Hyannis, Mass. Its outer anchorage, known as Chatham Roads, is a capacious, deep, unobstructed harbor of refuge from northerly and easterly gales.

The inner harbor, locally known as "Stage" Harbor, is small but well landlocked. It is about one-half mile long, 500 to 600 feet wide, and has 8 to 12 feet depth at mean low water. Its entrance was originally obstructed by three bars, on which the depth at mean low water was not to exceed 4 feet. The mean rise or fall of the tide is 5 feet.

The project for the improvement of the inner harbor was submitted December 19, 1890, and was based on a survey made in October, 1890. It proposed to dredge a channel 6 feet deep at mean low water through the three obstructing bars, 100 feet wide at the inner bar, 150 feet wide at the middle bar, and 200 feet wide at the outer bar, at an estimated cost of $10,000.

On March 24, 1897, a revised estimate of cost of the project was submitted, in accordance with Department letter 16423, August 7, 1896.

This estimate increased the cost of the improvement $3,732.79, the increase being necessary because of the small amount of work to be done and the distance of Chatham Harbor from large ports where dredging plants are maintained.

The total appropriations to date have been $13,732.79.

The expenditures to June 30, 1899, were $4,426.10.

At that date the improved channel through the middle and inner bars had been dredged 100 feet wide, 6 feet deep at mean low water. Nothing had been done on the outer bar. At least 5 feet draft could be carried into the harbor at mean low water.

The river and harbor act of March 3, 1899, appropriated $3,732.79 to complete the improvement of this harbor.

On March 14, 1899, a project was submitted for the expenditure of the available funds, and was approved by the Secretary of War March 20, 1899.

On July 14, 1899, a contract was entered into with Alonzo E. Smith, of New York City, N. Y., to dredge 25,000 cubic yards, more or less, of material at 32 cents per yard. This contract was approved July 25, 1899, and under it work was to be commenced on or before August 20, 1899, and was to be completed by June 30, 1900.

The contractor did not commence dredging until December 8, 1899, and suspended operations for the winter January 23, 1900, having in the meantime dredged 1,447 cubic yards.

On May 14, 1900, work not having been resumed, the contract was annulled by authority of the Chief of Engineers.

No improvement was secured by the work done under this contract, and at the date of this report the condition of the channel is the same as on June 30, 1899.

This work will be readvertised and the project will probably be completed during the present working season.

Chatham Harbor is in the collection district of Barnstable, Mass., of which Barnstable is the port of entry. The nearest light-house is Hardings Beach Light.

Money statement.

July 1, 1899, balance unexpended	$9,306.69
June 30, 1900, amount expended during fiscal year	1,058.80
July 1, 1900, balance unexpended	8,247.89

The dates and amounts of appropriations for this harbor are as follows:

Act of—	
September 19, 1890	$5,000.00
June 3, 1896	5,000.00
March 3, 1899	3,732.79
Total	13,732.79

COMMERCIAL STATISTICS.

The accompanying commercial statistics have been furnished by the collector of customs at Barnstable, Mass.:

Imports.	1898.	1899.	1900.
Coal ... tons..	1,300	1,600	1,200
Lumber ... feet..	100,000	300,000	337,000
Miscellaneous ... tons..	525	300	3,000

C 12.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

On February 23, 1899, it was reported that a wreck lying in Chatham, New Harbor, Massachusetts, was a dangerous obstruction to navigation. This report was referred to the office of the Chief of Engineers on February 25, 1899, and on March 4, 1899, an allotment of $20 was asked for to meet expenses of an examination of the wreck. This allotment was made on March 9, 1899. On April 25, 1899, a report of the examination was made. The wreck was reported such an obstruction to navigation as is contemplated in sections 19 and 20 of the river and harbor act of March 3, 1899, and its removal was recommended at an estimated cost of $250.

The wreck was a portion of some vessel, name unknown, and lay in the anchorage of the harbor in about 12 feet of water at mean low tide.

On April 28, 1899, an allotment of $250 was made for removal of this wreck.

Proposals were invited by public advertisement dated May 25, 1899, and on June 26, 1899, bids were received and opened for removing the wreck. An abstract of these bids was published in the Annual Report of the Chief of Engineers, United States Army, 1899, page 1096.

On July 12, 1899, a contract was entered into with Mr. Edwin Canney, of Pigeon Cove, Mass., to remove the wreck. On July 25, 1899, the work was satisfactorily completed.

The total cost of removal was $142.89.

On April 25, 1899, it was reported to the Chief of Engineers, United States Army, that the wreck of the small schooner *Lydia Jane*, in Provincetown Harbor, Massachusetts, was an obstruction to navigation. This communication was forwarded to Col. Charles R. Suter, Corps of Engineers, for report on April 29, 1899.

This wreck was reported such an obstruction to navigation as was contemplated by the river and harbor act of March 3, 1899, and its removal was recommended at an estimated cost of $250.

The wreck consisted of the bottom of the boat with its ballast, lying about 100 yards south of the New York, New Haven and Hartford Railroad wharf in about 8 feet of water at mean low tide.

On June 28, 1899, an allotment of $250 was made for removal of this wreck.

Advertisement was issued under date of July 22, 1899, calling for bids for removing the wreck, and on August 22, 1899, bids were received and opened. An abstract of these bids will be found annexed.

On August 31, 1899, a contract was entered into with Mr. Joseph N. Bloomer, of Chatham, Mass., for removal of the wreck, and the work was satisfactorily completed on September 5, 1899.

The total cost of removal was $131.09.

Abstract of proposals for removing wreck from Provincetown Harbor, Mass., opened August 22, 1899, by Col. Charles R. Suter, Corps of Engineers.

No.	Name and address of bidder.	Price bid.	Remarks.
1	Townsend & Olsen, Boston, Mass	$243.00	
2	Charles W. Johnston, Lewes, Del	239.00	
3	Joseph N. Bloomer, Chatham, Mass	79.49	Informal; lowest bid.
4	Provincetown Wrecking Co., Provincetown, Mass	100.00	
5	Hiram W. Phillips, Quincy, Mass	185.00	

The contract was awarded to Mr. Joseph N. Bloomer, with the approval of the Chief of Engineers.

C 13.

PRELIMINARY EXAMINATION OF WINTHROP HARBOR, MASSACHUSETTS, WITH A VIEW TO PROVIDING CHANNELS OF A WIDTH OF 75 AND 100 FEET, RESPECTIVELY, AND A DEPTH OF 12 AND 15 FEET, RESPECTIVELY.

[Printed in House Doc. No. 135, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: The river and harbor act approved March 3, 1899, provides for a preliminary examination of Winthrop Harbor, Massachusetts, with a view to providing channels of a width of 75 and 100 feet, respectively, and a depth of 12 and 15 feet, respectively.

The duty of making this examination was assigned to Col. Charles R. Suter, Corps of Engineers, and I have now the honor to submit the accompanying copy of his report of July 28, 1899, on the subject. It is the opinion of Colonel Suter, concurred in by me, that the harbor is not worthy of improvement by the General Government to the extent specified in the act.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF COL. CHARLES R. SUTER, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Boston, Mass, July 28, 1899.

GENERAL: In accordance with instructions contained in your letter of March 15, 1899, I have the honor to submit the following report upon the preliminary examination of—

> Winthrop Harbor, Massachusetts: To provide channels of a width of seventy-five and one hundred feet, respectively, and a depth of twelve feet and fifteen feet, respectively.

Winthrop Harbor is situated in the northeastern part of Boston Harbor, immediately westward of Winthrop Head. The harbor is about 200 acres in area at high water, but is dry at low tide excepting in a channel which has been dredged 50 feet wide and 6 feet deep at mean low water by the United States Government under a project dated November 28, 1887. This channel leads to the wharves of Winthrop Beach. There are several other wharves along the south shore of the town of Winthrop which at high tide may be reached by vessels drawing not more than 8 to 9 feet.

The commerce interested in the improvement of the harbor consists of supplies of coal, lumber, etc., for local consumption. A line of small steamers is operated during the summer months, running between Boston and Winthrop through this channel, and a number of small yachts, whose owners have summer residences along the shore, also make use of the channel.

The improvement of the harbor by dredging channels of dimensions specified by the river and harbor act of March 3, 1899, would probably cost from $60,000 to $75,000; and while the harbor may be worthy of further improvement by the United States Government, it is not, in my opinion, worthy of improvement to the extent specified by the river and harbor act.

Very respectfully, your obedient servant,

CHAS. R. SUTER,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

C 14.

EXAMINATION AND SURVEY OF COHASSET HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 284, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 9, 1900.

Sir: I have the honor to submit the accompanying copies of reports dated June 26 and December 16, 1899, with map,[1] by Col. Charles R. Suter, Corps of Engineers, upon preliminary examination and survey, respectively, of Cohasset Harbor, Massachusetts, with a view to deepening the same and its channel, made in pursuance of the requirements of the river and harbor act of March 3, 1899.

The plan of improvement presented by Colonel Suter contemplates the dredging of a channel 4 feet deep at mean low water, 60 feet wide on straight portions, and 75 feet wide on curves, from the roadstead, through the bar and following the general direction of the natural channel of the harbor, to the town wharfs; also, to dredge a turning basin opposite the town wharfs, about 350 feet by 350 feet in area. The estimated cost of this work, including contingencies, is $21,670.

In the opinion of Colonel Suter the locality is worthy of improvement by the General Government.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF COHASSET HARBOR, MASSACHUSETTS, WITH A VIEW TO DEEPENING THE SAME AND ITS CHANNEL.

United States Engineer Office,
Boston, Mass., June 26, 1899.

General: In accordance with instructions contained in your letter of March 15, 1899, I have the honor to submit the following report upon the preliminary examination of Cohasset Harbor, Massachusetts:

Cohasset is situated on the shore of Massachusetts Bay, about 16 miles southeast of Boston in a straight line. The entrance to the harbor lies about 1½ miles west of Minots Ledge Light. The harbor consists of an outer roadstead of ample depth and size for the requirements of its commerce, but open to the effects of easterly storms, and a shallow inner harbor southwest of White Head in which there is a narrow, tortuous channel about 1 mile long to the town wharfs, with but about 2 feet depth at mean low water.

The commerce consists of supplies of coal, building material, and miscellaneous supplies for local consumption, conveyed in coasting vessels of the smaller class, and approximates an annual valuation of about $25,000.

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[1] Not reprinted. Printed in House Doc. No. 284, Fifty-sixth Congress, first session.

The harbor is worthy of improvement, and I respectfully recommend an allotment of $600 for making a hydrographic survey of the harbor.

Very respectfully, your obedient servant,

CHAS. R. SUTER,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Cohasset Harbor, Massachusetts, "with a view to deepening the same and its channel."

The locality is reported to be worthy of improvement, and I recommend that a survey be made and that the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

SURVEY OF COHASSET HARBOR, MASSACHUSETTS, WITH A VIEW TO DEEPENING THE SAME AND ITS CHANNEL.

UNITED STATES ENGINEER OFFICE,
Boston, Mass., December 16, 1899.

GENERAL: I have the honor to submit the following report of a survey of Cohasset Harbor, Massachusetts, made in October, 1899, in accordance with the requirements of section 22 of the river and harbor act of March 3, 1899, and with your instructions of August 25, 1899.

With this report I also submit a tracing of the plot of the survey, showing the location and extent of the proposed improvement of the channel.

The survey was made by United States Assistant Engineer T. T. Hunter Harwood, assisted by Mr. Charles W. Mason, hydrographer, during the month of October, 1899, and attention is respectfully invited to Mr. Harwood's accompanying report for the details thereof.

Cohasset is situated upon the west shore of Boston Bay, about 8 miles southeast by south from Boston Light. The harbor consists of an outer roadstead and an inner basin entered from the roadstead through a narrow and shoal connecting channel.

The outer roadstead is well sheltered from all but easterly winds and has an average depth of 10 feet at mean low water. The inner basin is about 28 acres in area, nearly all of which is dry at mean low water. The connecting channel has a least width of about 50 feet between the low-water lines and is obstructed by a bar at its entrance from the roadstead, over which there is but 0.7 foot of water at mean low water, so that the draft of vessels which can enter the harbor is practically limited by the extent of rise of tide, the mean rise or fall of which at this place is 9.4 feet.

The commerce of the harbor of Cohasset consists of supplies of coal, building material, and miscellaneous supplies for local consumption, and approximates an annual valuation of $25,000.

This commerce is conveyed in coasting vessels necessarily of light draft, and great difficulty is experienced in securing suitable vessels for this service, owing to the general tendency to replace vessels of this class, when lost or condemned, with others of increased tonnage and greater draft.

The only means of meeting this difficulty is to increase the available depth of water in the channels, and the survey of this harbor shows that relief may be secured in this case within a reasonable limit of cost.

On the tracing of the survey plan is indicated the project which I respectfully recommend for the improvement of the harbor, viz: To dredge a channel 4 feet deep at mean low water, 60 feet wide on straight portions and 75 feet wide on curves, from the roadstead through the bar, and following the general direction of the natural channel of the harbor to the town wharves, and a turning basin opposite the town wharves about 350 feet by 350 feet in area.

The cost of this improvement is estimated as follows:

Dredging 63,000 cubic yards, at 30 cents per cubic yard	$18,900
Removal of ledge, 40 cubic yards, at $20 per cubic yard	800
	19,700
Engineering expenses and contingencies, 10 per cent	1,970
Total	21,670

Cohasset Harbor is in the collection district of Boston, Mass., of which Boston is the port of entry. The nearest light-house is Minots Ledge Light.

Very respectfully, your obedient servant,

CHAS. R. SUTER,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

REPORT OF MR. T. T. HUNTER HARWOOD, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Boston, Mass., December 12, 1899.

COLONEL: I have the honor to submit the following report upon a survey of Cohasset Harbor, Massachusetts, made in October, 1899, in accordance with your instructions; also a map of the survey, drawn to a scale of 1:2,000:

LOCATION AND DESCRIPTION OF COHASSET HARBOR.

Cohasset Harbor is situated upon the west shore of Boston Bay, about 8 miles southeast by south from Boston Light and about 1½ miles southwest by west from Minots Ledge Light.

The harbor consists of an outer roadstead and an inner basin connected by a narrow shoal channel. The roadstead is exposed to the full sweep of wind and sea from northwest, through north to east, and affords no shelter to vessels during the heavy northeast gales which prevail on this coast in the winter season. It is well sheltered at all other points of the compass by the mainland and its projecting headlands.

The depth of water in the anchorage is about 10 feet at mean low water.

The inner basin is about 28 acres in area, practically all of which is dry at mean low water, and upon its western shore the wharves of the town of Cohasset are situated. The basin is landlocked on all sides except the northeast.

The channel connecting the inner basin with the roadstead is about 5,500 feet long from the 6-foot contour of the roadstead to the town wharves, and has a least width of about 50 feet between the low-water lines.

The available depth of water in this channel is limited by a bar at its eastern end, over which there is only 0.7 foot of water at mean low water.

FIELD WORK OF THE SURVEY.

The area covered by the survey extends from the roadstead to the town wharves, including the bar at the eastern end of the channel, the connecting channel, and the inner basin.

In prosecuting the work of the survey a system of triangulation containing 18 stations was established, in which 96 angles were measured. From these points ranges for sounding were laid out and soundings were intersected. Seventy-five ranges of soundings, aggregating 9.85 miles in length, were run, on which 6,643 soundings and 577 intersecting angles were taken.

PLANE OF REFERENCE AND BENCH MARK.

All soundings are referred to the plane of mean low water, which was determined by comparison of simultaneous observations of high waters taken at a temporary tide staff in Cohasset Harbor and at the United States Engineer tide staff at Boston Light. The mean rise or fall of tide is 9.4 feet.

The established bench mark is a drill hole in the coping stone at the northeasterly corner of the United States light-house wharf wall and is 13.73 feet above mean low water.

The operations of the party in the field were under the direction of Mr. Charles W. Mason, hydrographer.

The material underlying the channel consists of mud, sand, and gravel. One small ledge was found, which it will be necessary to remove in the event of improvement of the harbor. This ledge lies just east of the entrance to the inner basin, on the north side of the channel, and projects 0.8 foot above mean low water.

Very respectfully, your obedient servant,

T. T. Hunter Harwood,
Assistant Engineer.

Col. Chas. R. Suter,
Corps of Engineers, U. S. A.

C 15.

PRELIMINARY EXAMINATION OF SANDWICH HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 136, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit herewith a copy of report dated August 5, 1899, by Col. Charles R. Suter, Corps of Engineers, upon preliminary examination of Sandwich Harbor, Massachusetts, provided for by the river and harbor act approved March 3, 1899.

It is the opinion of the local officer, concurred in by me, that the harbor is not worthy of improvement by the General Government at the present time.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF COL. CHAS. R. SUTER, CORPS OF ENGINEERS.

United States Engineer Office,
Boston, Mass., August 5, 1899.

General: In accordance with instructions contained in your letter of March 15, 1899, I have the honor to submit the following report upon the preliminary examination of Sandwich Harbor, Massachusetts.

Sandwich Harbor, Massachusetts, is situated on the western shore of Cape Cod Bay, southwest from Provincetown Harbor, and about 45 miles south of Boston Harbor, Massachusetts. The harbor lies behind sand beaches, through which an inlet gives access to the harbor.

In the course of preliminary examination I have been in correspondence with those interested in the improvement of this harbor, and I quote in full the following letter from Mr. Carleton, chairman of the board of selectmen of Sandwich:

> In reply to your favor of the 28th ultimo, I would say that the prospects of the Cape Cod Canal are such at the present time as to make it very uncertain what the future needs of a harbor will be for this town, and we are loath to ask for any expenditure that might turn out ill advised. We would therefore respectfully ask that consideration of the matter be postponed (without injury to our cause) till such time as our needs can be more definitely determined.

In view of the foregoing I have the honor to report that in my opinion the harbor is not worthy of improvement at the present time.

Very respectfully, your obedient servant,

Chas. R. Suter,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

C 16.

MODIFICATION OF HARBOR LINES IN CHARLES RIVER, AT CAMBRIDGE MASSACHUSETTS.

(*a*) NEAR EASTERLY END OF RIVER STREET BRIDGE.

United States of America,
Commonwealth of Massachusetts.

To the Honorable the Secretary of War
of the United States of America:

Respectfully represents the park commissioners of the city of Cambridge, in said Commonwealth, created under the authority given by chapter one hundred and fifty-four of the acts of the legislature of

Massachusetts passed in the year eighteen hundred and ninety-two and acts in amendment thereof and supplementary thereto; that in carrying out certain plans for the improvement of Charles River and the construction of parks along the banks, it is necessary and desirable to do certain excavation and filling and other work so as to change the shore line on said Charles River near the easterly abutment of the River Street Bridge, so called, in said Cambridge, in the manner shown on a plan entitled "City of Cambridge Park Dep't Proposed Solid Filling on Charles River between River and Brookline Sts.," dated June 16, 1899, signed by L. M. Hastings, city engineer, and on file in the office of said city engineer, a copy of which plan accompanies this petition:

That according to said plan it is proposed to extend and locate a sea wall in continuation of the sea wall as it now exists adjoining the northerly end of said easterly abutment of said bridge and to fill the space between said proposed sea wall and the present pier and bulkhead line, thereby changing and placing said pier and bulkhead line upon the line of said proposed sea wall.

That the place and manner of said excavation and filling have already been approved by the board of harbor and land commissioners of the Commonwealth of Massachusetts, as appears by copy of license granted by said board hereto annexed.

The water front on the banks of the river where the proposed changes are to be made is controlled by the petitioners.

Wherefore the Cambridge Park commissioners respectfully petition the Department of War to authorize the changes in the harbor line of the said Charles River, in accordance with said plan.

GEO. HOWLAND COX,
WILLIAM M. RICHARDSON,
Cambridge Park Commissioners.

COMMONWEALTH OF MASSACHUSETTS.

No. 2262.

Whereas the city of Cambridge, by its board of park commissioners in the county of Middlesex, and Commonwealth aforesaid, has applied to the board of harbor and land commissioners for license to excavate and fill solid and change the shore line of Charles River between Brookline street and River street in the city of Cambridge, and has submitted plans of the same; and whereas due notice of said application and of the time and place fixed for a hearing thereon has been given, as required by law, to the mayor and aldermen of the city of Boston:

Now, said board having heard all parties desiring to be heard, and having fully considered said application, hereby, subject to the approval of the governor and council, authorizes and licenses the said city of Cambridge, subject to the provisions of the nineteenth chapter of the public statutes, and of all laws which are or may be in force applicable thereto, to change the present shore line of Charles River between Brookline street and River street, in the city of Cambridge, by the construction of a sea wall, and by excavation and filling, in conformity with the accompanying plan No. 2262, so that the high-water line shall be the line marked C–B on said plan.

Said sea wall may be built from A to B on said plan, and a wooden box culvert with a tide gate therein, satisfactory to this board, shall be built and laid in the location shown on said plan, to be maintained and kept open by the city of Cambridge until the area of tide water easterly of said sea wall has been filled.

The license is granted subject to the laws of the United States.

Material used for filling may be taken from Charles River under the direction of this board.

The plan of said work is on file in the office of said board, numbered 2262, and a duplicate of said plan accompanies this license, and is to be referred to as a part hereof.

The amount of tide water displaced and excluded by the work hereby authorized shall be ascertained by said board, and compensation therefor shall be made by the said city of Cambridge, its successors and assigns, by paying into the treasury of the Commonwealth ten (10) cents for each cubic yard so displaced, being the amount hereby assessed by said board, the same to be reserved as a compensation fund for the harbor of Boston. In assessing compensation, however, deduction shall be made, yard for yard, for material, when taken from Charles River under the direction of this board and used for filling as aforesaid.

Nothing in this license shall be so construed as to impair the legal rights of any person.

This license shall be void unless the same and the accompanying plan are recorded within one year from the date hereof in the registry of deeds for the south district of the county of Middlesex.

In witness whereof said board of harbor and land commissioners have hereunto set their hands this nineteenth day of July, in the year eighteen hundred and ninety-nine.

WOODWARD EMERY,
CLINTON WHITE,
Harbor and Land Commissioners.

COMMONWEALTH OF MASSACHUSETTS,
Boston, July 26, 1899.

Approved by the governor and council.

E. F. HAMLIN,
Executive Secretary.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
November 6, 1899.

Respectfully referred to Col. Chas. R. Suter, Corps of Engineers, for report.

To be returned.

A. MACKENZIE,
Acting Chief of Engineers.

[Third indorsement.]

U. S. ENGINEER OFFICE,
Boston, Mass., November 9, 1899.

Respectfully returned to the Chief of Engineers, United States Army, with recommendation for approval.

CHAS. R. SUTER,
Colonel, Corps of Engineers.

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
November 13, 1899.

Respectfully returned to the Secretary of War.

The Cambridge park commissioners request a modification in the existing pier and bulkhead line on Charles River near the easterly end of the River Street Bridge in the city of Cambridge, as shown on the accompanying map.[1]

Attention is invited to the recommendation of Colonel Suter, in third indorsement hereon, in which I concur.

Two copies of the map have been prepared for the signature of the Secretary.

A. MACKENZIE,
Acting Chief of Engineers.

NOTE.—The lines referred to in the above letter, and shown on the map accompanying, were approved by the Secretary of War under date of December 13, 1899, the approval being indicated on the map.

(*b*) ABOVE BOYLSTON STREET BRIDGE.

UNITED STATES OF AMERICA,
Commonwealth of Massachusetts.

To the Honorable the Secretary of War
of the United States of America:

Respectfully represents the board of metropolitan park commissioners, created by chapter 417 of the acts of 1892 of the general court of Massachusetts, and the park commissioners of the city of Cambridge, Mass., authorized by chapter 154 of the acts of 1892: That in carrying out certain plans for the improvement of Charles River and the construction of parks along the banks, it is necessary and desirable to do certain excavation and filling so as to change the shore lines on said Charles River from a point about 1,300 feet above Brighton (now Boylston Street) Bridge to a point above the Cambridge Hospital grounds, in the manner shown on a plan entitled, "City of Cambridge, park department, plan showing proposed change in the pier and bulkhead line on Charles River, between points 1,300 feet and 4,300 feet above Boylston Street Bridge, June 12, 1899, L. M. Hastings, City Engineer, Cambridge, Mass."

That according to said plan certain excavation is to be made on one side of the river inside or back of the present pier and bulkhead line as established by the United States Government; and that it will be necessary that certain other places on the opposite side of the river outside of the pier and bulkhead line on that side of said river shall be filled; that the place and manner of said excavation and filling have already been approved by the board of harbor and land commissioners of the Commonwealth of Massachusetts, as appears by copies of licenses granted by said board hereto annexed.

The water front on both banks of the river where the proposed changes are to be made is controlled by the petitioners.

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[1] Not printed.

Wherefore, the board of metropolitan park commissioners and the Cambridge park commissioners respectfully petition the Department of War to authorize the changes in the harbor lines on both sides of the said Charles River, in accordance with the specifications contained on said plan, copies of which are hereto annexed; the width of the channel between said lines to be not less than two hundred (200) feet.

William B. de las Casas,
Edwin B. Haskell,
David N. Skillings,
Ellieton P. Whitney,
Metropolitan Park Commissioners.
Geo. Howland Cox,
W. M. Richardson,
Cambridge Park Commissioners.

COMMONWEALTH OF MASSACHUSETTS.

No. 2264.

Whereas the board of metropolitan park commissioners of Boston, in the county of Suffolk and Commonwealth aforesaid, has applied to the board of harbor and land commissioners for license to excavate and fill solid and change the southwesterly shore line of Charles River from near Boylston Street Bridge to a point above Cambridge Hospital grounds, and has submitted plans of the same; and whereas due notice of said application, and of time and place fixed for a hearing thereon, has been given, as required by law, to the mayor and aldermen of the city of Boston;

Now, said board, having heard all parties desiring to be heard, and having fully considered said application, hereby authorizes and licenses the said metropolitan park commissioners, subject to the provisions of the nineteenth chapter of the public statutes, and of all laws which are or may be in force applicable thereto, to change the present southwesterly shore line of Charles River, from a point near Boylston Street to a point opposite the Cambridge Hospital grounds in the city of Boston, by excavating and filling, in conformity with the accompanying plan No. 2264, which shows in detail thereon the present and proposed sections of said river and its banks at three points.

This license is granted subject to the laws of the United States.

Material used for filling may be taken from Charles River under the direction of this board.

This license shall be operative only upon condition that the board of metropolitan park commissioners shall first or contemporaneously set back the southwesterly shore line of Charles River, in accordance with license from this board of even date herewith, No. 2264, and plan referred to therein, to the end that at no time shall the cross section of the river be less than called for by the plans.

The plan of said work is on file in the office of said board, numbered 2263, and a duplicate of said plan accompanies this license, and is to be referred to as a part hereof.

The amount of tidewater displaced by the work hereby authorized shall be ascertained by said board, and compensation therefor shall be made by the said city of Cambridge, its successors and assigns, by paying into the treasury of the Commonwealth twenty-five (25) cents for each cubic yard so displaced, being the amount hereby assessed by said board, the same to be reserved as a compensation fund for the harbor of Boston. In assessing compensation, however, deduction shall be made, yard for yard, for material, when taken from Charles River under the direction of this board and used for filling, as aforesaid.

Nothing in this license shall be so construed as to impair the legal rights of any person.

This license shall be void unless the same and the accompanying plan are recorded, within one year from the date hereof, in the Registry of deeds for the south district of the county of Middlesex.

In witness whereof said board of harbor and land commissioners have hereunto set their hands this nineteenth day of July, in the year eighteen hundred and ninety-nine.

WOODWARD EMERY,
CLINTON WHITE,
Harbor and Land Commissioners.

COMMONWEALTH OF MASSACHUSETTS,
Boston, July 26, 1899.

Approved by the governor and council.

E. F. HAMLIN,
Executive Secretary.

COMMONWEALTH OF MASSACHUSETTS.

No. 2263.

Whereas the city of Cambridge, by its board of park commissioners, in the county of Middlesex and Commonwealth aforesaid, has applied to the board of harbor and land commissioners for license to excavate and fill solid and change the northeasterly shore line of Charles River from near Boylston Street Bridge to a point above the Cambridge Hospital grounds, and has submitted plans of the same; and whereas due notice of said application, and of the time and place fixed for a hearing thereon, has been given, as required by law, to the mayor and aldermen of the city of Cambridge:

Now, said board, having heard all parties desiring to be heard, and having fully considered said application, hereby, subject to the approval of the governor and council, authorizes and licenses the said city of Cambridge, subject to the provisions of the nineteenth chapter of the public statutes and of all laws which are or may be in force applicable thereto, to change the present northeasterly shore line of Charles River from a point near Boylston Street Bridge to a point above the Cambridge Hospital grounds, in the city of Cambridge, by the construction of sea walls and bulkheads and by excavation and filling, in conformity with the accompanying plan, No. 2263, which shows in detail thereon the present and proposed sections of said river and its banks at three points.

This license is granted subject to the laws of the United States. Material used for filling may be taken from Charles River under the direction of this board.

This license shall be operative only upon condition that the board of metropolitan park commissioners shall first or contemporaneously set back the southwesterly shore line of Charles River in accordance with license from this board of even date herewith, No. 2264, and plan referred to therein, to the end that at no time shall the cross section of the river be less than called for by the plans.

The plan of said work is on file in the office of said board, numbered 2263, and a duplicate of said plan accompanies this license and is to be referred to as a part hereof.

The amount of tide water displaced by the work hereby authorized shall be ascertained by said board, and compensation therefor shall be made by the said city of Cambridge, its successors and assigns, by paying into the treasury of the Commonwealth twenty-five (25) cents for each cubic yard so displaced, being the amount hereby assessed by said board, the same to be reserved as a compensation fund for the harbor of Boston. In assessing compensation, however, deduction shall be made, yard for yard, for material when taken from Charles River under the direction of this board and used for filling, as aforesaid.

Nothing in this license shall be so construed as to impair the legal rights of any person.

This license shall be void unless the same and the accompanying plan are recorded, within one year from the date hereof, in the registry of deeds for the south district of the county of Middlesex.

In witness whereof said board of harbor and land commissioners hereunto set their hands this nineteenth day of July, in the year eighteen hundred and ninety-nine.

WOODWARD EMERY,
CLINTON WHITE,
Harbor and Land Commissioners.

COMMONWEALTH OF MASSACHUSETTS,
Boston, July 26, 1899.

Approved by the governor and council.

E. F. HAMLIN,
Executive Secretary.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
November 6, 1899.

Respectfully referred to Col. Charles R. Suter, Corps of Engineers, for report.

To be returned.

A. MACKENZIE,
Acting Chief of Engineers.

[Third indorsement.]

U. S. ENGINEER OFFICE,
Boston, Mass., November 9, 1899.

Respectfully returned to the Chief of Engineers, U. S. Army, with recommendation for approval.

CHAS. R. SUTER,
Colonel, Corps of Engineers.

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
November 13, 1899.

Respectfully returned to the Secretary of War.

The metropolitan park commissioners and the Cambridge park commissioners request a modification in the established pierhead and bulkhead line on both sides of the Charles River between points 1,300 feet and 4,300 feet above Boylston Street Bridge, as indicated by the solid red lines marked "Proposed new pier and bulkhead line" on the accompanying map.[1]

Inviting attention to the report of Colonel Suter in third indorsement hereon, I recommend that the desired modification be approved.

Three copies of the map have been prepared for the signature of the Secretary of War, as the applicants desire two copies to be returned to them for file in their respective offices.

A. MACKENZIE,
Acting Chief of Engineers.

NOTE.—The lines referred to in the above letter, and shown on the map accompanying, were approved by the Secretary of War under date of December 13, 1899, the approval being indicated on the map.

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[1] Not printed.

APPENDIX D.

IMPROVEMENT OF RIVERS AND HARBORS IN SOUTHEASTERN MASSACHUSETTS AND IN RHODE ISLAND.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Harbor of refuge at Hyannis, Massachusetts.
2. Harbor of refuge at Nantucket, Massachusetts.
3. Harbor at Vineyard Haven, Massachusetts.
4. Woods Hole Channel, Massachusetts.
5. New Bedford Harbor, Massachusetts.
6. Taunton River, Massachusetts.
7. Sakonnet River, Rhode Island.
8. Harbor at Sakonnet Point, Rhode Island.
9. Pawtucket River, Rhode Island.
10. Providence River and Narragansett Bay, Rhode Island.
11. Green Jacket Shoal, Providence, Rhode Island.
12. Wickford Harbor, Rhode Island.
13. Fall River Harbor, Massachusetts.
14. Newport Harbor, Rhode Island.
15. Harbor of refuge at Point Judith, Rhode Island.
16. Entrance to Point Judith Pond, Rhode Island.
17. Harbor of refuge at Block Island, Rhode Island.
18. Great Salt Pond, Block Island, Rhode Island.
19. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEYS.

20. Bass River Harbor, Massachusetts.
21. Harbor at Hyannis, Massachusetts.
22. Cotuit Harbor, Massachusetts.
23. Vineyard Haven, Massachusetts, harbor of refuge.
24. Cottage City, Massachusetts.
25. New Bedford Harbor, Massachusetts.
26. Westport Point Harbor, Massachusetts.
27. Assonet River, Massachusetts.
28. Pawtucket River, Rhode Island.
29. Providence Harbor and River, Rhode Island.

HARBOR LINES.

30. Mount Hope Bay at Fall River, Massachusetts.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., July 14, 1900.

GENERAL: I have the honor to transmit herewith annual report on river and harbor works under my charge at close of fiscal year ending June 30, 1900.

First Lieut. R. P. Johnston, Corps of Engineers, has been on duty under the direction of this office during the year.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

D 1.

HARBOR OF REFUGE AT HYANNIS, MASSACHUSETTS.

The harbor of Hyannis lies on the south shore of the peninsula of Cape Cod, about 15 miles to the westward of the heel of the cape, and is an important harbor of refuge. (For map see page 592, Annual Report of 1884.)

The mean rise and fall of the tide is about 3.75 feet.

Original condition.—Before improvement it was an open roadstead, exposed to southerly storms.

At the adoption of the present project the 15.5 feet depth anchorage area protected by the breakwater covered only about 47 acres.

Present project.—The present project, that of 1884, provides for the deepening to 15.5 feet at mean low water, by dredging, of about 36 additional acres of protected area, to be limited on the west by a line running due north from the western end of the breakwater and on the north by a line running parallel to the breakwater and 1,500 feet from it, leaving a berm of 100 feet along the northern side of the breakwater, at a cost estimated in 1884 at $45,743.20. A plan of the works may be found at page 260, Annual Report of the Chief of Engineers for 1885, and page 804 of 1893, and further information at page 621 of 1885.

Amount expended and results to June 30, 1899.—In the years 1827–1838 a breakwater of riprap granite, 1,170 feet long, was constructed, covering an anchorage of about 175 acres, the entrance to which had a depth of about 15.5 feet. In the years 1852–1882 extensive repairs were made in increasing the width of its base and the size of the stone forming its sides and top. One hundred and twenty-three thousand three hundred and fifty dollars and sixty-two cents was spent on this work. The total amount expended on the present project up to June 30, 1899, was $43,668.23, by which 26.6 acres of the 36 had been deepened to 15.5 feet and two 25-feet wide cuts 13 feet deep at mean low tide were made in the channel leading to the wharf of the New York, New Haven and Hartford Railroad Company.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $245.79. No operations have been in progress during the past fiscal year, other than making a survey of the locality, the report of which was submitted under date of November 27, 1899. (See Appendix D 26.)

Work required to complete the existing project.—The work still required to complete the existing project is the completion of the dredging to a depth of 15.5 feet over the area remaining to be deepened. The survey referred to above developed the fact that to accomplish this will require the removal of 130,000 cubic yards of material, at an estimated cost of 25 cents per cubic yard, or at a total cost of $32,500.

Operations contemplated for the fiscal year ending June 30, 1901.—The unexpended balance (together with such sums as may be appropriated by Congress) will be applied to carrying out the present project.

Hyannis is in the Barnstable collection district, and Barnstable is the nearest port of entry. The amount of revenue collected at Barnstable in the last calendar year was $1,630.87. The main value of the harbor is for a harbor of refuge. The nearest light-house is Hyannis light. The nearest fortification is Fort Rodman, at Clark Point, New Bedford, Mass.

Money statement.

July 1, 1899, balance unexpended	$2, 176. 85
June 30, 1900, amount expended during fiscal year	245. 79
July 1, 1900, balance unexpended	1, 931. 06
Amount (estimated) required for completion of existing project	32, 500. 00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	32, 500. 00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

Previous projects.

March 2, 1827	$10, 650. 00	
April 30, 1830	6, 517. 82	
March 2, 1831	8, 400. 00	
July 3, 1832	7, 600. 00	
March 2, 1833	5, 000. 00	
June 28, 1834	10, 000. 00	
March 3, 1835	9, 000. 00	
March 3, 1837	5, 000. 00	
July 7, 1838	8, 764. 00	
August 30, 1852	5, 000. 00	
July 11, 1870	12, 000. 00	
March 3, 1871	10, 000. 00	
March 3, 1873	10, 000. 00	
June 23, 1874	5, 000. 00	
June 18, 1878	3, 000. 00	
March 3, 1879	2, 500. 00	
March 3, 1881	5, 000. 00	
Total		$123, 431. 82

Existing project.

August 5, 1886	$10, 000. 00	
August 11, 1888	10, 000. 00	
September 19, 1890	8, 000. 00	
July 13, 1892	6, 000. 00	
August 18, 1894	3, 500. 00	
June 3, 1896	6, 000. 00	
March 3, 1899	2, 162. 00	
Total		45, 662. 00
Received from sale of material		20. 68
Total		169, 114. 50

COMMERCIAL STATISTICS.

The commerce arriving and leaving Hyannis Harbor, Massachusetts, by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from Messrs. T. Crocker & Sons, Hyannis, Mass.):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Tobacco	5	15	20	10	25	26
Rice	2	2	....	....	25	20
Grains and forage	1,000	3,750	1,000	900	2,300	2 400
Vegetables and truck	80	1	300	100	100	100
Live stock and products	134	75	....	30	30	30
Fish, oysters, etc	195	1,032	200	250	225	300
Lumber and products	2,400	2,850	2,500	3,000	5,250	5,500
Coal, minerals, etc	14,500	14,500	18,000	19,500	18,000	18,500
Fertilizers	50	....	....	50	50	50
General merchandise	270	....	2,000	1,000	1,000	1,000
Sundries	....	300	200	180	180	200
Total	18,636	22,525	24,220	25,020	27,185	28,126

New transportation companies established during the year, none reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	60	10	300
Freight mainly	15	12	450
Passenger mainly	40	9	400
Fishing	20	6	70
Tugs	250	11	80
Pleasure boats	200	7	75
Sail:			
Freight	300	12	400
Fishing boats	300	8	6
Oyster boats	10	4	8
Pleasure boats, large	60	8	60
Pleasure boats, small	250	3	8
Barges	100	14	500

D 2.

HARBOR OF REFUGE AT NANTUCKET, MASSACHUSETTS.

Nantucket Harbor is the only well-protected harbor on Nantucket Sound between the harbors of Marthas Vineyard (Vineyard Haven and Edgartown) and Provincetown, a distance of about 100 miles, except the small harbor of Hyannis, on the other (the north) side of Nantucket Sound. The navigation of this sound is intricate and dangerous by reason of numerous shoals. Nantucket Harbor has a considerable area with a depth of water in excess of 12 feet, and the object of the improvement is to make it a harbor of refuge for vessels plying between ports north and south of Cape Cod, estimated to be 50,000 annually. In the memorial to Congress on which the first appropriation for this harbor of refuge was based it was stated that more than 500 vessels had been wrecked in the vicinity of the island. (For map of harbor see page 423, Annual Report of 1880, and page 576 of Report of 1885.)

The mean rise and fall of the tide is about 3 feet.

Original conditions.—At the adoption of the present project no jetties existed, and the channel entrance was barred by a shoal of 1.5 miles width on which there was only 6 feet depth of water at low tide, the channel being very crooked and subject to changes in location.

Present project.—The present approved project, that of 1880, as modified in 1885, provides for the construction of two jetties as training walls, one on each side of the harbor entrance, planned so as to allow the tidal current to assist in scouring out and maintaining a good channel, and for the completion of the work by dredging where necessary, to obtain a depth of from 12 to 15 feet at low water in this channel, all at a total cost estimated in 1885 at $375,000.

A plan of the works may be found at page 578, Annual Report of the Chief of Engineers for 1885, and page 806 of 1893; and further information at page 436 of 1880, page 544 of 1881, page 595 of 1884, and pages 563, 575, 578 of 1885.

Amount expended and results to June 30, 1899.—The funds appropriated from 1829 to 1844, $45,734.75, were expended in ineffectual dredging of an entrance channel. The amount expended on the present project up to June 30, 1899, was $239,085.17, by which the west jetty had been built to 4,955 feet length, of which 3,955 feet length was to full height, and 1,000 feet of partial section, and the jetty strengthened and leveled up at some points where it had settled and been somewhat washed down. The east jetty had been built up to its full height for a length of 834 feet from the shore end, then the foundation laid for a length of 191 feet, then came a gap of 160 feet, then 1,300 feet raised to half-tide level, then 2,355 feet raised to 1.5 feet below low-tide level (the total length from the shore end being 4,840 feet), and mounds of heavy stone built to protect lantern staffs near the present ends of both jetties, and at intervals of 200 feet along the submerged portions smaller mounds extending above high water.

The first portions of the west jetty were constructed without a core by simply placing large rough stone on the line of the jetty, which, from the small cross section of the jetty, at first triangular and later with a top width of 4 feet, offers not only many large openings for the passage of sand, but has been washed down to a considerable extent by the action of the sea and ice. This method of construction was followed in all that portion of the work built prior to 1884 and includes 3,955 feet of the length of the jetty. The construction since that time has been made with a core of small stone of varying sizes from 5 to 200 pounds in weight protected by a facing of large stone. This has made a compact structure and one practically sand tight.

In order that the full benefit of the western jetty could be realized, it should be repaired in such a manner as to make it as nearly sand tight as possible and the top raised to its original height of 5 feet in places where it is now less.

This work could have been done much better in the first instance, but a short section near the shore end thus repaired in 1884 has stood well and presents a much better barrier to the passage of sand than any other portion of the old west jetty.

It is estimated that this would require 15,000 tons of stone at $2 per ton, or a total of $30,000, in addition to the estimated cost of the approved project.

In December, 1896, during an unusually severe storm, a breach was made between the ocean and the head of the harbor at what is called the "Haulover." Reports thereon were submitted in January and

February, and a more detailed report, after a careful examination of the existing conditions, was submitted in May, 1897.

The breach still remains open, but does not appear to have caused any perceptible change in the depth of water at the harbor entrance.

There is now a depth of 8 feet in the channel, which before improvement was limited to 6 feet.

At the close of the fiscal year a contract had been entered into with Eugene S. Belden, of Hartford, Conn., for raising submerged parts of both jetties to the half-tide level and repairing the shore end of the east jetty, the price of stone in place to be $1.47 per ton of 2,000 pounds.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $19,158.50.

Work under the contract with Eugene S. Belden, of Hartford, Conn., was commenced on July 8, 1899, and was discontinued between the months of December and May. The time for completing the contract was extended to June 1, 1900. Work was resumed early in May, and the contract completed May 19. Eleven thousand seven hundred and three tons of stone were placed in the jetties. The submerged portion of the east jetty was raised to the half-tide level, 600 feet of the outer end of the west jetty was raised to the full height and 400 feet to the half-tide level, some additional stone was placed in the vicinity of the east jetty light to afford protection to the light keeper in landing, and repairs were made to the shore end of the east jetty.

For dimensions of jetty and method of construction see Annual Report of the Chief of Engineers for 1896, Part I, page 627.

A light was maintained near the outer end of each jetty during the year.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Mr. Sidney Fisher as inspector.

There is a gap in the east jetty about 191 feet from shore end, where no stone has ever been placed. This gap is 160 feet long and is now about 16 feet deep. In my opinion this gap should be closed, and, together with the next 1,500 feet, be built up to full height as projected. The bottom between the jetties is covered in places with patches of marine growth, locally termed "hog beds," which materially affect the navigable depth. These patches prevent the wash of sand, and the difference in depth over them and alongside is often from 1 foot to 18 inches. These should be removed, but whether this can be done by dragging can only be determined by experiment. If not by dragging, then a dredge will be needed to remove them.

Work required to complete the existing project.—The work required to complete the existing project is the raising of the incomplete parts and the further extension of both jetties, and the excavation, by dredging, of so much of the channel as may not be excavated by tidal scour.

Operations contemplated for the fiscal year ending June 30, 1901.—Future operations will depend upon appropriations to be made by Congress.

Nantucket is in the Nantucket collection district and is a port of entry. No revenue was collected during the last calendar year. The value of the harbor is mainly as a harbor of refuge. The nearest light-houses are Nantucket Cliff and Brant Point lights. The nearest fortification is that of Fort Rodman at Clark Point, New Bedford, Mass.

Money statement.

July 1, 1899, balance unexpended		$20,014.83
June 30, 1900, amount expended during fiscal year		19,158.50
July 1, 1900, balance unexpended		856.33
July 1, 1900, outstanding liabilities		78.00
July 1, 1900, balance available		778.33
Amount (estimated) required for completion of existing project		115,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$100,000.00	
For maintenance of improvement	15,000.00	
		115,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

Previous projects.

May 23, 1828, survey	$300.00	
March 2, 1829	30,000.00	
March 2, 1831	8,265.00	
July 3, 1832	6,000.00	
June 14, 1844	1,169.75	
		$45,734.75

Existing project.

July 14, 1880	$50,000.00	
March 3, 1881	25,000.00	
August 2, 1882	25,000.00	
July 5, 1884	10,000.00	
August 5, 1886	15,000.00	
August 11, 1888	20,000.00	
September 19, 1890	25,000.00	
July 13, 1892	25,000.00	
August 18, 1894	25,000.00	
June 3, 1896	20,000.00	
March 3, 1899	20,000.00	
		260,000.00
Total		305,734.75

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
Eugene S. Belden	July 20, 1899	Aug. 1, 1899	[a] Jan. 1, 1900

[a] Extended to June 15, 1900.

COMMERCIAL STATISTICS.

The commerce arriving and leaving Nantucket Harbor, Massachusetts, by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from various citizens of Nantucket):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Tobacco	....	40	30	35	30	30
Rice	40	2	3	4	5	5
Grains and forage	650	871	390	400	380	390
Vegetables and truck	600	415	340	325	350	350
Live stock and products	20	5	6	10	10	10
Fish, oysters, etc	450	500	400	500	600	650
Naval stores	10	8	8	2	8	3
Lumber and products	1,500	1,000	1,200	1,400	1,500	1,500
Coal, minerals, etc	8,000	7,000	8,000	10,000	12,000	12,500
Fertilizers	400	480	16	25	50	50
Machinery	150	30	2,000	1,500	1,000	1,000
General merchandise	1,550	1,560	1,600	2,000	2,000	2,100
Sundries	160	213	500	500	500	500
Total	13,530	11,624	14,488	16,701	18,428	19,088

New transportation companies established during the year, none.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	480	8	500
Freight mainly	10	7	100
Passenger mainly	40	7	200
Fishing	20	4	5
Tugs	25	5	6
Pleasure boats	80	6	5
Sail:			
Freight	10	7	6
Fishing boats	80	4	5
Pleasure boats, large	75	5	6
Pleasure boats, small	300	4	3

D 3.

IMPROVEMENT OF VINEYARD HAVEN HARBOR, MASSACHUSETTS.

Vineyard Haven is a deep indentation in the northern shore of the island of Marthas Vineyard, on the southern side of Vineyard Sound. It is triangular in form and faces the northeast. The width of the mouth of the harbor, or the distance between the points of land on the east and west sides of the entrance known as East Chop and West Chop, is about 1.25 miles, and from a line connecting the chops to the narrow southerly end of the harbor, at which is situated the town of Vineyard Haven, the distance is about 1.75 miles. The entire area of the harbor between the shore lines is about 949 acres, of which some 657 acres have a depth of not less than 15 feet. The mean rise and fall of the tide is 1.7 feet.

Original condition.—At the mouth of the harbor the wearing away of the chops by the action of the waves in storms had been noted for many years. The former site of a light-house on West Chop had entirely disappeared. The débris was carried by the current into the harbor, where it formed shoals, which were gradually impairing the anchorage capacity, especially in the upper part of the harbor. (For map of harbor see p. 580 of Annual Report of 1887.)

Plan of improvement.—The present approved project, that of 1887 as modified in 1889, provides for the protection of the chops (or headlands) from erosion and the intervening harbor from being filled by the eroded material, the whole to be done by means of stone sea walls and jetties, to be built along the beach in front of the bluffs at both headlands, all at a total cost estimated in 1889 at $60,000.

A description of the work may be found at page 594, Annual Report of the Chief of Engineers for 1882, page 577 of 1887, and page 612 of 1889, and a map of the same at page 812 of 1893.

Amount expended and results to June 30, 1899.—The amount expended to June 30, 1899, was $54,304.26, by which there had been built a sea wall 1,210 feet long, a jetty 50 feet long, and six small spurs extending back from the sea wall to the foot of the bluff on the East Chop; a sea wall 880 feet long and three jetties, 150, 135, and 280 feet long, a wharf and a short stone breakwater 60 feet in length near the end of the wharf on the West Chop, and 2,400 feet length of riprap wall along the low-water line in front of the bluff on the east side of the West Chop.

For dimensions of walls and details of construction see Annual Report of Chief of Engineers for 1896, Part I, page 632.

Operations during the past fiscal year.—No works of improvement were in progress during the past fiscal year. The river and harbor act of March 3, 1899, provided for an examination of "Vineyard Haven, Mass., with a view to its further protection and improvement as a harbor of refuge by a breakwater or otherwise." The report of this examination was submitted under date of September 13, 1899.

Work required to complete the existing project.—The project so far as the shore protection is concerned is completed, but certain repairs are needed to maintain the work in a serviceable condition.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to apply the balance of funds to repairing existing works.

Vineyard Haven is in the Edgartown collection district. Edgartown is the nearest port of entry. The amount of revenue collected at Edgartown in the last calendar year was $664.89. The nearest light-houses are those on East and West chops. The nearest fortification is that of Fort Rodman, at Clark Point, New Bedford, Mass.

Money statement.

July 1, 1899, balance unexpended	$5,695.74
July 1, 1900, balance unexpended	5,695.74

AMOUNTS APPROPRIATED.

Existing project.

August 11, 1888	$25,000	June 3, 1896	$7,000
September 19, 1890	10,000	March 3, 1899	3,000
July 13, 1892	7,500		
August 18, 1894	7,500	Total	60,000

COMMERCIAL STATISTICS.

The commerce arriving at and leaving Vineyard Haven Harbor, Massachusetts, by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from Mr. C. J. Doherty, Weather Bureau Service, Vineyard Haven, Mass.):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cotton and products	40	35	60	50	50	50
Tobacco	15	16	5	7	7	12
Rice	45	50	50	30	30	35
Grain and forage	800	1,100	2,000	2,000	2,000	2,200
Vegetables and truck	15	30	30	30	30	40
Live stock and products	200	150	200	150	150	175
Fish, oysters, etc	500	700	1,500	1,500	1,500	2,000
Naval stores	60	10	20	15	15	15
Lumber and products	350	900	3,000	10,000	12,000	15,000
Coal, minerals, etc	52,000	47,000	48,000	50,000	75,000	90,000
Fertilizers	50	40	100	75	100	100
Machinery	....	50	50	55	60	65
General merchandise	5,000	8,500	6,000	7,450	7,500	8,000
Sundries	....	....	1,500	1,500	1,500	2,000
Total	59,075	58,581	62,515	73,862	99,942	119,692

New transportation companies established during the year, none.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	850	7	150
Freight mainly	225	15	900
Passenger mainly	50	7	150
Fishing	100	11	160
Tugs	500	12	110
Pleasure boats	600	9	90
Sail:			
Freight	6,500	12	700
Fishing boats	400	9	100
Oyster boats	20	5	20
Pleasure boats, large	450	12	100
Pleasure boats, small	350	5	20
Barges	1,300	15	1,200

D 4.

IMPROVEMENT OF WOODS HOLE CHANNEL, MASSACHUSETTS.

This harbor is on the north side of Vineyard Sound, and is divided into Great Harbor and Little Harbor. The name of Woods Hole is also applied to the adjoining strait or channel which connects the waters of Buzzards Bay with Vineyard Sound and separates the chain of islands known as the Elizabeth Islands from the southwestern extremity of the peninsula of Cape Cod.

Original condition.—Before improvement the entrance to Little Harbor was obstructed by a bar with but 7.5 feet of water on it at mean low water. Great Harbor has ample depth. The site of the wharves and basins of the United States Fish Commission and Revenue Marine was a submerged point of land extending from the shore of the harbor. In the strait the channels were crooked and obstructed by numerous bowlders, and the velocity of the currents at certain stages of the tide was from 4 to 5 miles per hour.

Plans of improvement.—The project of 1879 provided for making a channel through the bar at the entrance to Little Harbor and widening and deepening the channel in the strait. The project of 1883, extended in 1884 and 1886, provided for the construction of a retaining wall on the shore, a hollow pier and wharves for the use of the United States Fish Commission, and to serve also as a coaling station for vessels of the Revenue Marine and other branches of the public service, and as a harbor of refuge, all of which was completed in 1888. In the project of 1895, which is the present approved project, it is proposed to give the channel through the strait and its southeastern branch a width of 300 feet and a low-water depth of 13 feet, at an estimated cost of $396,000.

Amounts expended and results up to June 30, 1899.—The amount expended up to June 30, 1899, was $133,588.68. The first appropriation—that of 1852—had been expended in building a breakwater, which proved beneficial by arresting an influx of sand into Great Harbor. With the appropriation of 1879 the depth of water at entrance to Little Harbor had been increased from 7.5 to 10 feet and a direct channel made 120 feet wide and 9 feet deep through the strait, benefiting greatly the commerce passing through it. The wharves and piers had been completed in 1888, and a breach made in the east pier wall by storms, and the wharves had been repaired in 1895. A survey of the strait and Little Harbor had been made, and report, with project and estimate for further improvement, was submitted August 17, 1895. (See p. 750 and p. 72, Annual Report Chief of Engineers, 1895.) The work of deepening the channel through the strait had been commenced, and two cuts each 35 feet wide and 13 feet deep at mean low tide had been dredged through the shoal at its eastern entrance.

A project for the expenditure of the funds—$20,000—appropriated by the river and harbor act of March 3, 1899, was approved, in accordance with which specifications were prepared for continuing the dredging in the channel, and proposals received on June 15. The contract was awarded to the R. G. Packard Company, of New York, for dredging, at the rate of $2.23 per cubic yard. Owing to the large amount of summer travel through the strait, work was arranged to commence not earlier than October 1.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $19,993.30.

The work of removing bowlders and dredging in the channel through the Woods Hole Strait, under the contract with the R. G. Packard Company, of New York, described above, was commenced November 18, 1899, and completed April 7, 1900. Under this contract 7,683 cubic yards of sand and small bowlders and 86.5 cubic yards of bowlders exceeding one cubic yard each were removed. A number of the latter required drilling and blasting before they could be removed.

This work removed all obstructing shoals to a depth of 13 feet at mean low water in the southern half of the channel between its eastern end and the southern branch, known as "Broadway," the greater portion of the shoal at the junction of the two branches of the channel, and a shoal in mid-channel just west of the junction.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Arthur J. Ober as inspector.

Work required to complete the existing project.—The work required to complete the existing project is the widening and deepening of the channel through the strait.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to expend the available funds in widening and deepening the channel through the strait as appropriations are made by Congress, and unless unforeseen difficulties are encountered the work will be completed for much less than the estimated cost.

Woods Hole is in the Barnstable collection district. New Bedford is the nearest port of entry. The amount of revenue collected in the last calendar year was, at Barnstable $1,630.87 and at New Bedford $33,915.21. The nearest light-house is Nobska Light. The nearest fortification is that of Fort Rodman, at Clark Point, New Bedford, Mass.

Money statement.

July 1, 1899, balance unexpended	$20,011.24
June 30, 1900, amount expended during fiscal year	19,993.30
July 1, 1900, balance unexpended	17.94
July 1, 1900, outstanding liabilities	.20
July 1, 1900, balance available	17.74
Amount (estimated) required for completion of existing project	356,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	150,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

August 10, 1852	$2,500.00
March 3, 1879	15,000.00
August 2, 1882	52,000.00
July 5, 1884	25,000.00
August 5, 1886	14,500.00
March 2, 1895	5,000.00
June 3, 1896	20,000.00
March 3, 1899	20,000.00
Total	154,000.00
December 5, 1895, unexpended balance deposited to the credit of the United States Treasurer	400.08
Total	153,599.92

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
R. G. Packard Co	Aug. 18, 1899	Oct. 2, 1899	May 31, 1900.

COMMERCIAL STATISTICS.

The commerce arriving and leaving Woods Hole, Mass., by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from Mr. Walter O. Luscombe, of Woods Hole, Mass.):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Grains and forage	2,275	2,265	3,000	3,500	3,500	3,500
Vegetables and truck	4	8	9	15	25	25
Live stock and products	123	150	150	170	200	200
Fish, oysters, etc	158	225	200	210	250	300
Naval stores	5	5	15	28	40	40
Lumber and products	2,170	4,000	3,900	4,000	5,000	6,000
Coal, minerals and products	2,025	4,000	5,000	5,500	6,000	6,000
Fertilizers	100	50	75	200	250	250
General merchandise	1,115	1,082	1,200	1,200	1,200	1,200
Total	7,975	11,785	13,549	14,823	16,465	17,515

New transportation companies established during the year, none.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	400	10	900
Freight mainly	100	7	25
Passenger mainly	200	11	50
Fishing	50	8	30
Tugs	40	10	100
Pleasure boats	100	10	100
Sail:			
Freight	100	8	150
Fishing boats	125	8	50
Pleasure boats, large	50	4	15
Pleasure boats, small	200	3	5

D 5.

IMPROVEMENT OF NEW BEDFORD HARBOR, MASSACHUSETTS.

New Bedford Harbor is an estuary of Buzzards Bay and is the port of the cities of New Bedford and Fairhaven, Mass. New Bedford is an important port of entry. It is largely interested in manufactures, those of cotton predominating, and has an extensive commerce in addition to its whale fisheries. The population of New Bedford and Fairhaven in 1890 was about 45,000.

The mean rise and fall of the tide is about 4.2 feet.

Original condition.—Before improvement the channel had a ruling depth of about 12.5 feet at mean low water.

At the adoption of the present project the channel was winding and about 15 feet deep.

Plan of improvement.—The project of 1887, which provided for a channel 200 feet wide and 18 feet deep at mean low water from Buzzards Bay to New Bedford, at an estimated cost of $35,000, has been completed. The present approved projects are those of 1895, providing for dredging an anchorage area one-half mile long, 600 feet wide and 18 feet deep at mean low water, on the north side of the channel leading from New Bedford to Fairhaven, at an estimated cost of $57,689.33, and of 1899, providing for dredging a channel 250 feet wide and 18 feet deep at mean low water from the anchorage area through the new drawbridge between Fish and Popes islands to the deep water above, at an estimated cost of $34,000.

A description of the works may be found at page 514, Annual Report of the Chief of Engineers for 1888, and a plan of the same in House Ex. Doc. No. 86, Fiftieth Congress, first session, and at page 816, Annual Report for 1893; also at page 672, Annual Report for 1896, and in House Ex. Doc. No. 59, Fifty-fourth Congress, first session, and in House Ex. Doc. No. 146, Fifty-fourth Congress, second session.

Amount expended and results up to June 30, 1899.—The total amount expended to June 30, 1899, was $82,647.50, of which $17,691.37 had been expended in 1836–1839 in removing a wreck and dredging the sand bar which had been formed by it; $20,000 had been expended in 1875 to 1877 in completing a channel 300 feet wide and 15 feet deep from the deep water above Palmers Island to the wharves of New Bedford, and $44,896.13 since 1888 in deepening the channel to 18 feet at mean low water for a width of 200 feet from the wharves in New Bedford to the deep water of Buzzards Bay, and in adding 11 acres, by dredging, to the 18-foot anchorage area in the upper harbor.

Projects were approved for the expenditure of the funds appropriated by the river and harbor act of March 3, 1899, in accordance with which specifications were prepared and proposals for dredging received on June 8. Contracts were awarded to the Hartford Dredging Company, of Hartford, Conn., for dredging in the anchorage area, at 16 cents per cubic yard, and to Cole Brothers, of Fall River, Mass., for dredging in the channel through the drawbridge, at 17¼ cents per cubic yard.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $44,045.91. The work of dredging the channel from the anchorage area in the harbor through the new drawbridge between Fish and Popes islands, under the contract with Cole Brothers, of Fall River, Mass., described above, was commenced July 31, 1899, and completed May 15, 1900, work having been suspended during January, February, and March. Under this contract 173,324 cubic yards of mud and sand and 11.8 cubic yards of bowlders exceeding 1 cubic yard each were removed and the channel completed. Owing to the very soft character of the material through which the lower portion of the channel passes, there has been some inflow along the western side of a portion of the channel, and the full depth of 18 feet at mean low tide has not been maintained throughout. The work of dredging in the anchorage area, under the contract with the Hartford Dredging Company, described above, was commenced September 18, 1899, and completed January 20, 1900, the time for completion having been extended to January 31. Under this contract 53,008 cubic yards of mud were removed from the anchorage area in the prolongation of the channel leading to the new drawbridge, connecting that channel with the main channel leading to Buzzards Bay and adding 7.4 acres to the dredged anchorage area.

A survey was made of a portion of the harbor adjacent to the New Bedford wharf line and above and below the old drawbridge, with a view to securing additional data upon which to base an estimate of the cost of further improvement, and report thereon submitted in November, 1899.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Messrs. A. J. Ober, H. F. Hill, Samuel D.

Baker, Daniel E. Doherty, Martin E. Bennett, and G. Fred Allen, as inspectors. The survey was in charge of Mr. C. M. Winchell, as assistant engineer.

The work required to complete the existing projects.—The work required to complete the existing projects is the completion of the anchorage area and deepening the channel along the water front, particularly above the bridge, so as to connect the upper end of channel through the new draw with the coal and other docks just north of the old draw.

Operations contemplated for the fiscal year ending June 30, 1901.—Future operations will depend on appropriations made by Congress. The work most needed appears to be the relief of the docks just north of the old draw, which is to be closed, and the completion of the anchorage area.

New Bedford is in the New Bedford collection district, and is a port of entry. The amount of revenue collected in the last calendar year was $33,915.21. The nearest light-houses are Clark Point Light and the lights in New Bedford Harbor. The nearest fortification is Fort Rodman, at Clark Point, Massachusetts.

Money statement.

July 1, 1899, balance unexpended	$44,052.87
June 30, 1900, amount expended during fiscal year	44,045.91
July 1, 1900, balance unexpended	6.96
Amount (estimated) required for completion of existing project	37,689.33
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	37,689.33
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

July 4, 1836	$10,000.00
July 7, 1838	7,691.37
March 3, 1875	10,000.00
August 14, 1876	10,000.00
August 11, 1888	10,000.00
September 19, 1890	10,000.00
July 13, 1892	7,500.00
August 18, 1894	7,500.00
June 3, 1896	10,000.00
March 3, 1899	44,000.00
Total	126,691.37
Received from sale of material	9.00
Total	126,700.37

CONTRACTS IN FORCE.

Dredging draw channel.

Contractor.	Date of approval.	To commence.	To complete.
Cole Brothers	July 18, 1899	Aug. 15, 1899	June 30, 1900

Dredging anchorage area.

Contractor.	Date of approval.	To commence.	To complete.
The Hartford Dredging Co	Sept. 11, 1899	Aug. 15, 1899	*a* Jan. 1, 1900

a Extended to January 30, 1900.

COMMERCIAL STATISTICS.

The commerce arriving and leaving New Bedford, Mass., by water during the calendar years 1895–1899, is estimated as follows (based mainly upon reports received from Mr. George F. Bartlett, collector of customs, New Bedford, Mass.):

Class of goods.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cotton and products	9,036	22,400	15,000	25,000	25,500
Tobacco	28	50	40	50	100
Grain and forage	30,470	15,000	20,000	15,000	15,000
Vegetables and truck	2,920	7,100	5,000	7,000	7,000
Live stock and products	160	500	400	500	500
Fish, oysters, etc	1,783	3,250	2,500	3,000	3,500
Naval stores	1,275	....	25	20	20
Lumber and products	22,500	33,500	35,000	30,000	22,000
Coal, minerals, and products	517,375	650,000	500,000	470,000	485,000
Fertilizers	60	150	200	1,200	1,500
General merchandise	62,160	100,000	75,000	73,500	80,000
Sundries	11,656	10,000	15,000	10,000	12,000
Total	659,423	841,950	668,165	635,270	653,120

New transportation companies established during the year: None reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	725	8	560
Freight mainly	475	17	1,000
Passenger mainly	500	8	60
Tugs	650	8	50
Pleasure boats	240	8	50
Sail:			
Freight	1,150	13	1,100
Fishing boats	575	5	10
Pleasure boats, large	300	11	150
Pleasure boats, small	1,000	5	10
Barges	400	13	1,000

D 6.

IMPROVEMENT OF TAUNTON RIVER, MASSACHUSETTS.

This river rises in Norfolk County, Mass., and empties in Mount Hope Bay, a part of Narragansett Bay. It is about 44 miles in length.

The object of the improvement is to deepen and widen the channel so that vessels of 11 feet draft can at high water go up to the city of Taunton, which for its extensive manufactures requires large quantities of coal, iron, clay, molding sand, and other heavy articles. The rise and fall of the tide before improvement was 5.25 feet at Dighton and 3.4 feet at Taunton.

Original condition.—In its original condition the channel was narrow and obstructed by bowlders, and from Berkley Bridge to Taunton its depth was not, in places, more than 5 feet at mean high water. A vessel of 30 tons burden was as large as could go up to Taunton.

At the adoption of the present project the channel was limited to 9 feet at high water, and was too narrow and too much obstructed by bowlders for easy navigation by the craft making use of it.

Plan of improvement.—The present approved project, that of 1880, provides for the widening and deepening of the river so as to secure a channel of at least 12 feet depth at high water, with 100 feet width from its mouth up to Berkley Bridge (above Dighton); thence 12 feet depth with 80 feet width (100 feet width at bends) up to Briggs Shoal; thence 11 feet depth with the same width up to the shipyard; thence 11 feet depth with 60 feet width up to the Weir Bridge, Taunton; all at a total cost estimated in 1893 at $125,000.

A plan of the works may be found at page 606, Annual Report of the Chief of Engineers for 1884, and page 824 of the Annual Report for 1893; and a later more detailed plan in House Ex. Doc. No. 86, Fiftieth Congress, first session; and further information at page 373 of the Annual Report for 1880, page 519 of the Annual Report for 1888, and page 823 of the Annual Report for 1893.

Amount expended and results to June 30, 1899.—The total amount expended up to June 30, 1899, was $180,510.11. The $63,000 appropriated from 1870 to 1879 secured a depth of 9 feet at high water up to the head of navigation. (See p. 375, Annual Report for 1880.) By the expenditure of the subsequent appropriations the proposed work had been practically completed, so that there was a fairly good channel with a minimum depth of 11 feet at high water from the head of navigation to Narragansett Bay, which, however, needed widening at a few points at and below the lower end of the Needles. A project was approved for the expenditure of the funds ($7,000) appropriated by the river and harbor act of March 3, 1899, in accordance with which specifications were prepared and proposals for dredging received June 15. The contract was awarded to Cole Brothers, of Fall River, Mass., at the rate of 98 cents per cubic yard.

Operations during the last fiscal year.—The work of dredging in the channel just above Berkley Bridge under the contract with Cole Brothers described above was commenced August 8 and completed September 2, 1899. Under this contract 5,165 cubic yards of sand were removed, completing the reach just above Berkley Bridge. In December, 1899, the bowlders which obstructed navigation just below "Burts Turn" and at the upper end of the Needles were removed by hired labor and a hired steam lighter, completing all proposed work from the head of navigation down to Berkley Bridge.

This work was in the local charge of Mr. Edward Parrish, as assistant engineer, with Mr. John F. Parks and R. J. Donovan as inspectors.

Work required to complete the existing project.—There remains to complete the existing project the widening and deepening of the channel below the Needles and the removal of a small amount of ledge rock. In addition to this, about $5,000 every four years will be required to maintain the dredged channel.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to continue the widening and deepening of the channel at the narrow and shoal places as appropriations are made by Congress.

Taunton River is in the Fall River collection district. Fall River is the nearest port of entry. The amount of revenue collected at Fall River in the last calendar year was $17,360.61. The nearest light-house is the Borden Flat Light-House. The nearest fortification is Fort Adams, Newport Harbor, Rhode Island.

Money statement.

July 1, 1899, balance unexpended	$7,489.89
June 30, 1900, amount expended during fiscal year	7,489.70
July 1, 1900, balance unexpended	.19

AMOUNTS APPROPRIATED.

Previous projects.

July 11, 1870	$10,000	
March 3, 1871	10,000	
June 10, 1872	10,000	
March 3, 1873	10,000	
June 23, 1874	10,000	
March 3, 1875	10,000	
June 18, 1878	2,000	
March 3, 1879	1,000	
		$63,000

Present project.

July 14, 1880	17,500	
March 3, 1881	25,000	
August 2, 1882	25,000	
July 5, 1884	26,500	
September 19, 1890	7,000	
July 13, 1892	7,000	
August 18, 1894	5,000	
June 3, 1896	5,000	
March 3, 1899	7,000	
		125,000
Total		188,000

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
Cole Brothers	July 20, 1899	Aug. 5, 1899	Jan. 1, 1900

COMMERCIAL STATISTICS.

The commerce arriving and leaving Taunton River, Massachusetts, by water during the calendar years ending December 31, 1893–1896, 1898, and 1899 is estimated as follows (based mainly upon reports received from the Staples Coal Company, Taunton, Mass.):

Class of goods.	1893.	1894.	1895.	1896.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cotton and products	6,600	8,750	9,188	8,500	9,000	9,200
Grains and forage	35,500	47,300	49,665	47,000	51,000	54,000
Lumber and products	16,000	21,000	22,050	24,000	25,500	28,000
Coal, minerals, and products	289,000	390,000	409,500	410,000	450,000	475,000
General merchandise	7,000	....	....	500	1,000	1,200
Sundries	....	10,000	10,500	10,000	11,200	12,000
Total	354,100	477,050	500,903	500,000	547,700	579,400

New transportation companies established during the year, none.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
		Feet.	*Tons.*
Steam (tugs)	515	7	50
Sail (freight)	725	9	200
Barges	775	9	900

D 7.

IMPROVEMENT OF SAKONNET RIVER, RHODE ISLAND.

The Sakonnet River is an arm of the sea between the island of Rhode Island and the mainland, extending from the ocean to Mount Hope Bay around the head of Rhode Island. The entrance from the ocean is unobstructed, and formerly the entire river from Narragansett Bay to the ocean was navigable for the largest ships.

At present the upper end of the river is obstructed by two bridges or causeways, the northern one belonging to the New York, New Haven and Hartford Railroad Company and the other owned by the State of Rhode Island. These causeways have draws of insufficient capacity, and the approved project of July, 1896, proposed to increase the width and depth of the draw opening through the causeway owned by the State from 35 feet, present width, to 100 feet; and from 9 feet, present depth, to 25 feet at mean low water.

For fuller description of the subject, see Report of the Chief of Engineers for 1895, pages 729 to 737.

No work has been done and no funds expended during the past fiscal year, owing to the fact that the State assembly's permission to the United States to widen and deepen the draw opening in its bridge is conditioned in such a way as to make it inoperative until the railroad company shall have widened and deepened the draw opening of its bridge.

Notice was received in May, 1898, that the New York, New Haven and Hartford Railroad Company had been ordered by the Secretary of War to construct a suitable draw in its bridge by May 1, 1899. The time for completing the new draw in the railroad bridge was subsequently extended to May 1, 1900, and afterwards to May 1, 1901. At the close of the fiscal year the pier abutments, etc., were completed and the ironwork was being put in place.

Sakonnet River is in the collection district of Newport; which is a port of entry. The amount of revenue collected at Newport in the last calendar year was $6,767.98. The nearest light-houses are Muscle Bed Shoals, Bristol Ferry, and Warwick light-houses. The nearest fortification is Fort Adams, R. I.

Money statement.

July 1, 1899, balance unexpended	$40,000.00
July 1, 1900, balance unexpended	40,000.00

AMOUNTS APPROPRIATED.

June 3, 1896	$20,000
March 3, 1899	20,000
Total	40,000

COMMERCIAL STATISTICS.

The commerce arriving and leaving Sakonnet River, Rhode Island, by water during the calendar years ending December 31, 1896–1899, is estimated as follows (based upon reports received from Mr. J. A. Pettey, general manager of the Sakonnet Steamboat Company):

Class of goods.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Tobacco		3	4	5
Rice		2	2	2
Grains and forage	2,100	2,500	2,450	4,120
Vegetables and truck	10	50	65	115
Live stock and products	25	40	25	30
Fish, oysters, etc	200	300	410	630
Naval stores			40	40
Lumber and products	350	430	850	950
Coal, minerals, etc. [a]	650	750	4,536	5,450
Fertilizers	5	45	60	90
Machinery	5	10	12	20
General merchandise	300	400	450	610
Sundries	15	25	30	30
Total	3,660	4,555	8,934	12,092

[a] The large increase in item of "coal, minerals, etc.," is due to establishment of a power station for the Fall River and Newport Street Railway system.

New transportation companies established during the year: None reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	300	8	150
Fishing	400	15	250
Tugs	10	7	90
Pleasure boats	15	7	100
Sail:			
Freight	25	15	250
Fishing boats	200	3	4
Pleasure boats, large	4	8	80
Pleasure boats, small	300	3	2
Barges	8	18	600

D 8.

IMPROVEMENT OF SAKONNET POINT HARBOR, RHODE ISLAND.

Sakonnet Point is a rocky headland on the eastern side of the mouth of Sakonnet River, and lies about 6 miles east of Newport.

Original condition.—Before improvement, Sakonnet Point, in connection with Church's Cove, just north of it, formed an anchorage protected from the southeast to northeast, but exposed to storms from the south to northwest. In 1827 a project was prepared for a breakwater 400 feet long at this point, and about 200 feet of this was built at about that time.

Plan of improvement.—The present project, that of 1897, approved by river and harbor act of March 3, 1899, provides for prolonging the old breakwater out to a rock nearly north of it and raising the whole to a height of 8 feet above mean low water. Reports of preliminary examinations of the locality may be found in the Annual Report of the Chief of Engineers, United States Army, for 1889, page 649, and for 1895, page 749, and a description of the proposed work at page 935 of the same report for 1897. The report of survey, with map, was printed in House Ex. Doc. No. 81, Fifty-fifth Congress, first session.

Amount expended and results to June 30, 1899.—No money was expended.

A project was approved for the expenditure of the funds appropriated by the river and harbor act of March 3, 1899, in accordance with which specifications were prepared, proposals received, and contract awarded to Eugene S. Belden, of Hartford, Conn., for constructing the breakwater, at the rate of $1.19 per ton of stone in place.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $14,721.21.

The work of constructing a breakwater under the contract with Eugene S. Belden, of Hartford, Conn., described above, was commenced August 17, 1899, and continued through the year with the exception of the months of January, February, and March. Up to the close of the fiscal year 16,745 tons of stone had been placed in the work and the contract nearly completed. About 486 tons of stone, which had been washed from the old breakwater into the harbor and interfered with the proper movement of vessels, were removed by the contractor and replaced in the breakwater.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Mr. Kneeland P. Partelow as inspector.

Work required to complete the existing project.—The work required to complete the existing project is the construction of the proposed breakwater.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to complete the breakwater.

Sakonnet Point is in the collection district of Newport, which is a port of entry. The amount of revenue collected at Newport in the last calendar year was $6,767.98. The nearest light-house is Sakonnet Point Light-House. The nearest fortification is Fort Adams, R. I.

Money statement.

July 1, 1899, balance unexpended		$25,000.00
June 30, 1900, amount expended during fiscal year		14,721.21
July 1, 1900, balance unexpended		10,278.79
July 1, 1900, outstanding liabilities	$6,283.84	
July 1, 1900, amount covered by uncompleted contracts	2,647.03	
		8,930.87
July 1, 1900, balance available		1,347.92

AMOUNT APPROPRIATED.

March 3, 1899	$25,000

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
Eugene S. Belden	July 26, 1899	Aug. 15, 1899	[a] Jan. 19, 1900

[a] Extended to June 30, 1900.

For the commercial statistics, see report of Sakonnet River, Rhode Island.

D 9.

IMPROVEMENT OF PAWTUCKET RIVER, RHODE ISLAND.

The navigable part of the Pawtucket (or Seekonk) River, an arm of Providence River, extends from Providence to Pawtucket, a city which in 1890 had a population of about 28,000 and extensive manufactures, depending largely on water transportation. The mean rise and fall of the tide is about 5 feet.

Original condition.—Before improvement the channel in the river was narrow and had a ruling depth of about 5 feet at mean low water.

At the adoption of the present project the channel was narrow and only about 7 feet deep.

Plan of improvement.—The present approved project, that of 1883, provides for the deepening of the river so as to secure a channel of at least 12 feet depth at low water with 100 feet width from its mouth at Providence up to opposite Grant & Co.'s wharf, at Pawtucket, and thence 12 feet depth with 40 feet width through a stone ledge for a short distance toward Division Street Bridge; all at a total cost estimated in 1883 at $382,500.

A plan of the works may be found at page 608, Annual Report of the Chief of Engineers for 1884, and page 830 of 1893, and further description at page 677 of 1895.

Amount expended and results up to June 30, 1899.—The total amount expended up to June 30, 1899, was $266,984.34.

The $52,000 appropriated between 1867 and 1882 had dredged the channel to 75 feet width and 7 feet depth at low water. This work was completed in 1876.

The expenditure of subsequent appropriations had dredged the channel to 100 feet width and 12 feet depth as far as projected and removed the ledge from the channel 40 feet wide and 12 feet deep in front of the wharves at Pawtucket. A small amount of dredging had also been done between the piers of Central or Red Bridge, near the lower end of the improved channel, while the city of Providence was rebuilding the bridge, making the water there 20 feet deep, and largely increasing the waterway through it.

The main channel has somewhat filled up near its banks.

The river and harbor act of March 3, 1899, provided for improving Pawtucket River, Rhode Island, continuing improvement, $30,000, provided that so much of this sum as may be deemed necessary by the engineer in charge may be used in straightening the channel between the mouth of Ten-mile River and Bucklins Island. Under date of March 31, authority was granted for a survey between the points named in the act. This has been completed and a project submitted.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $15,187.62.

A contract was entered into under date of October 3, 1899, with J. S. Packard, of Bayonne, N. J., for dredging a new channel between the mouth of Ten-mile River and Bucklins Island, at the rate of $14\frac{7}{8}$ cents per cubic yard. This new work will materially straighten the channel leading up to Pawtucket, at the same time coming nearer to the eastern shore of the river, where a number of manufacturing establishments have located.

Work under the contract commenced October 13 and continued during the remainder of the year, excepting during the months of January, February, and March. One hundred and eight thousand eight hundred and thirty-eight cubic yards were removed. At the close of the fiscal year work was still in progress.

Under date of November 25, a report of a survey was submitted covering the reaches between Red Bridge and Ten-mile River, and between Bucklins Island and Pawtucket Bridge. The report was published in House Doc. No. 113, Fifty-sixth Congress, first session.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Messrs. John F. Parks, Arthur J. Ober, and George H. Winchell as inspectors. The survey was under the charge of Mr. C. M. Winchell as assistant engineer.

Work required to complete the existing project.—The work yet to be done is to straighten the channel in the lower part of the river and to deepen it at points where it has shoaled.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to apply the funds on hand toward the straightening and deepening of the channel in its lower portions.

Pawtucket is in the collection district of Providence, and that port is the nearest port of entry. The amount of revenue collected in Providence in the last calendar year was $314,686.13. The nearest light-house is Sassafras Point Light. The nearest fortifications are Fort Adams, Newport, R. I., and Fort Greble, on Dutch Island, Rhode Island.

Money statement.

July 1, 1899, balance unexpended		$40,535.25
June 30, 1900, amount expended during fiscal year		15,187.62
July 1, 1900, balance unexpended		25,347.63
July 1, 1900, outstanding liabilities	$3,224.30	
July 1, 1900, amount covered by uncompleted contracts	20,810.33	
		24,034.63
July 1, 1900, balance available		1,313.00
Amount (estimated) required for completion of existing project		28,580.35
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		28,580.35

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

March 2, 1867	$17,000.00	August 18, 1894	$25,000.00
July 11, 1870	8,000.00	June 3, 1896	20,500.00
March 3, 1871	7,000.00	March 3, 1899	30,000.00
June 10, 1872	10,000.00		
March 3, 1873	10,000.00	Total	307,500.00
July 5, 1884	50,000.00	Received from sale of material	19.59
August 5, 1886	30,000.00		
August 11, 1888	35,000.00		
September 19, 1890	30,000.00	Total	307,519.59
July 13, 1892	35,000.00		

Abstract of proposals received and opened September 15, 1899, by Maj. D. W. Lockwood, Corps of Engineers, for dredging Pawtucket River, Rhode Island.

No.	Name and address of bidder.	Rate per cubic yard.
		Cents.
1	J. S. Packard, Bayonne, N. J	14⅞
2	Alonzo E. Smith, Islip, L. I	30
3	Jos. Laughlin, New York, N. Y	15
4	P. Sanford Ross, Incorporated, Jersey City, N. J	16
5	The International Contracting Co., New York, N. Y	22

Contract awarded to J. S. Packard.

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
J. S. Packard	Oct. 14, 1899	Nov. 1, 1899	Nov. 1, 1900

COMMERCIAL STATISTICS.

The commerce arriving and leaving Pawtucket River, Rhode Island, by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from the Newell Coal and Lumber Company, of Pawtucket, R. I.):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cotton and products	....	....	....	....	130	130
Lumber and products	12,600	8,620	9,000	9,000	8,000	8,000
Coal, minerals, etc	158,000	175,447	175,000	175,000	180,000	190,000
Fertilizers	7,000	1,099	1,000	1,000	1,000	200
General merchandise	5,850	10,308	11,500	10,000	10,000	7,500
Sundries	....	....	5,000	5,000	5,000	8,000
Total	183,450	195,474	201,500	200,000	204,130	213,830

New transportation companies established during the year: None reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight, mainly	260	10	500
Passenger, mainly	275	8	100
Tugs	500	7	80
Miscellaneous	125	5	50
Sail:			
Freight	175	10	300
Pleasure boats, large	20	7	100
Pleasure boats, small	300	3	4
Barges	125	10	500

D 10.

IMPROVEMENT OF PROVIDENCE RIVER AND NARRAGANSETT BAY, RHODE ISLAND.

Providence River is an estuary of Narragansett Bay. The object of its improvement is to furnish a wide and deep channel for European and coastwise commerce from the ocean to Providence, a city which had in 1890 about 132,000 inhabitants, being twenty-fifth in size of the cities of the United States, a city largely engaged in manufactures, and also a port of entry for an extensive region of country with which it is connected by railroads. The mean rise and fall of the tide is 4.7 feet.

Original condition.—Before the improvement of the river was commenced in 1853 many shoals obstructed navigation, and at one point in the channel, a place called The Crook, the available low-water depth was but 4.5 feet.

Plans of improvement.—The projects between 1852 and 1873 provided for deepening the channel by removing obstructing rocks and dredging at the shoalest points to secure first a depth of 9 feet and then 12 feet. This work was completed in 1878. The project of 1878 as modified in 1882 provided for a channel 300 feet wide and 25 feet deep from Providence to the deep water of Narragansett Bay and for an anchorage basin between Fox Point and Fields Point, with a depth of 20 feet 600 feet wide, a depth of 18 feet 725 feet wide, a depth of 12 feet 940 feet wide, and a depth of 6 feet 1,060 feet wide; all at a total estimated cost in 1882 of $675,000. The 25-foot channel of this project has been laid out in straight reaches (with enlargements at the angles), with a view to their being lighted later, if it should be found necessary, by range or leading lights, such as are used in similar cases in Chesapeake Bay, Delaware River, and other localities.

The river and harbor act of June 3, 1896, provides for securing a ship channel 400 feet in width and of a depth of 25 feet at mean low water from Sassafras Point, in Providence Harbor, through Providence River and Narragansett Bay, by the most direct route practicable, to the ocean by way of the "Western Passage," so called, at an estimated cost of $732,820.

A project for this new work from Sassafras Point to Conimicut Point was approved August, 1896, and the project for its extension from the latter point to the deep water of Narragansett Bay was approved August 31, 1898.

Up to 1878 the work was confined entirely to the harbor proper above Fields Point, except the partial removal of Bulkhead Rock. By 1878 the growing commerce of Providence required a greater depth of water, and this necessitated the deepening of the natural channel below Fields Point, which had hitherto been ample for vessels that could reach the wharves. This condition was met by improving the channel below Fields Point so as to make it 300 feet wide and 25 feet deep at mean low water. Then the widening and deepening of the harbor above Fields Point was continued until, in 1896, provision was made for widening the existing channel between Sassafras Point and Conimicut Point, where Providence River joins Narragansett Bay, and extending it to the deep water in the Western or Dutch Island Passage by way of Rocky Point and Warwick Neck. This will give a somewhat shorter distance between Conimicut Point and the ocean than by the natural deep-water route via Ohio Ledge and to the eastward of Prudence Island.

A plan of the old works may be found at page 622, Annual Report of the Chief of Engineers for 1884, page 830 of 1893, and further special information at page 235 of 1878 and page 557 of 1882.

Amount expended and results to June 30, 1899.—The amount expended up to June 30, 1899, was $831,554.81, by which a channel 300 feet wide and 25 feet deep had been secured up to the city of Providence, Bulkhead Rock had been removed, and an anchorage area 1,060 feet wide, with depths varying from 6 to 20 feet, had been dredged between Fields Point and Fox Point; but both the channel and anchorage area had shoaled considerably in places and needed some redredging.

A survey of the river between Sassafras and Conimicut points was made in October, 1896, for securing data for dredging under the appropriation of 1896.

A continuous contract was entered into on February 26, 1897, with Mr. P. Sanford Ross, of Jersey City, N. J., at 8¼ cents per cubic yard, for removing about 1,122,000 cubic yards of material between those points. Under this contract 1,136,951 cubic yards of material were removed, practically completing the channel between Sassafras Point and Conimicut Light-house, with the exception of a small amount of dredging at points where the full depth had not been attained.

Under date of November 16, 1898, a continuous contract was entered into with Messrs. Perkins & O'Brien, of New York, for the extension of the new channel below Conimicut Light-house, by the "Western Passage," requiring the removal of about 2,036,401 cubic yards of material, at 10.8 cents per cubic yard, work to be commenced March 1, 1899, and completed July 1, 1902. The work of dredging under this contract was commenced March 1, 1899, and 111,191 cubic yards were removed up to the beginning of the present fiscal year.

Operations during the past fiscal year.—The amount expended during the present fiscal year was $61,468.98.

At the beginning of the fiscal year work was in progress under contract with P. Sanford Ross, of Jersey City, N. J., for dredging a channel 400 feet wide and 25 feet deep between Sassafras Point and Conimicut Light-House. This contract was completed on July 17, 1899, by redredging a few shoal spots that had been left in the channel. A total of 1,242,960 cubic yards were removed under the contract, and that portion of the channel was completed.

Work was also in progress under the contract with Perkins & O'Brien, of New York, for the extension of the channel below Conimicut Light-House by the "Western Passage" of Narragansett Bay, and was continued through the year, excepting during the months of February and March. Three hundred and eighty-nine thousand six hundred and seventy-seven cubic yards of mud and sand were removed during the fiscal year.

This work was under the local charge of Mr. Edward Parrish as assistant engineer, with Messrs. C. O. Abell, George L. Bennett, John F. Parks, Philip S. Knauer, George Burdick, Harwood E. Read, jr., and Charles B. Marsh, as inspectors.

Operations contemplated during the fiscal year ending June 30, 1901.—It is proposed to continue the work of dredging in the new ship channel below Conimicut Light-House.

Providence River is in the collection district of Providence, which is a port of entry. The amount of revenue collected at Providence in the last calendar year was $314,686.13. The nearest light-houses are the six light-houses in Providence River. The nearest fortifications are Fort Greble, on Dutch Island, and Fort Adams, R. I.

Money statement.

July 1, 1899, balance unexpended		$145,088.58
Amount appropriated by sundry civil act approved June 6, 1900		54,489.00
		199,577.58
June 30, 1900, amount expended during fiscal year		61,468.98
July 1, 1900, balance unexpended		138,108.60
July 1, 1900, outstanding liabilities	$7,364.83	
July 1, 1900, amount covered by uncompleted contracts	165,850.26	
		173,215.09
Amount (estimated) required for completion of existing project		59,984.03
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		59,984.03
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

AMOUNTS APPROPRIATED.

August 30, 1852	$5,000.00	August 11, 1888	$40,000.00
August 30, 1852, survey	1,500.00	September 19, 1890	50,000.00
May 2, 1867	25,000.00	July 13, 1892	50,000.00
July 11, 1870	5,000.00	August 18, 1894	17,500.00
July 15, 1870	2,500.00	June 3, 1896	25,000.00
June 10, 1872	10,000.00	June 4, 1897	125,000.00
March 3, 1873	10,000.00	July 1, 1898	125,000.00
March 18, 1878	5,000.00	March 3, 1899	10,000.00
June 18, 1878	50,000.00	June 6, 1900	54,489.00
March 3, 1879	60,000.00		
July 14, 1880	60,000.00	Total	1,030,989.00
March 3, 1881	60,000.00	Received from sale of material	143.39
August 2, 1882	125,000.00		
July 5, 1884	85,000.00		
August 5, 1886	30,000.00	Total	1,031,132.39

Contracts in force.

Contractor.	Date of approval.	To commence.	To complete.
P. Sanford Ross	Mar. 10, 1897	Apr. 1, 1897	[a] July 1, 1899
Perkins & O'Brien	Dec. 13, 1898	Mar. 1, 1899	July 1, 1902

[a] Extended to August 1, 1899.

COMMERCIAL STATISTICS.

The commerce arriving and leaving Providence River, Rhode Island, by water during the calendar years ending December 31, 1894–1897 and 1899, is estimated as follows (based mainly upon reports received from Mr. J. T. P. Bucklin, harbor master, and other citizens of Providence, R. I.):

Class of goods.	1894.	1895.	1896.	1897.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Grains and forage	....	20,079	19,509	20,000	....
Lumber and products	60,000	47,503	46,500	64,989	57,208
Coal, minerals, etc	1,051,000	1,288,301	1,108,975	1,407,536	2,112,352
Oil, naphtha, etc	....	....	....	41,110	38,748
Fertilizers	2,000	366	375	583	....
General merchandise	521,700	373,694	375,600	559,000	615,000
Sundries	9,000	23,063	50,000	59,757	....
Total	1,643,700	1,753,006	1,600,950	2,152,975	2,823,308

New transportation companies established during the year, none reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	706	12	600
Freight mainly	275	18	1,450
Passenger mainly	3,201	7	518
Fishing	1,248	3	30
Tugs	1,200	13	100
Pleasure boats	1,300	5	30
Sail:			
Freight	800	18	1,500
Pleasure boats, large	303	7	40
Pleasure boats, small	1,000	3	7
Barges	1,600	16	1,200

D 11.

IMPROVEMENT OF GREEN JACKET SHOAL, PROVIDENCE RIVER, RHODE ISLAND.

Green Jacket Shoal is that part of Providence River which lies off the wharves on the south front of the city of Providence, being an important part of the harbor for anchorage purposes.

Original condition.—That part of the harbor in which the shoal is located is about 2,000 feet long by from 600 to 1,200 feet wide; and of this area the shoal occupied about 30 acres, that part of it which was included between the 15-foot curves measuring about 18 acres. There were channels on either side of the shoal, between it and the harbor lines, having at mean low water a width of 300 feet and a depth of 20 feet on the north side, and a width varying from 50 to 100 feet and a depth of about 15 feet on the south side. The water on the summit of the shoal was only 1 foot deep.

Plan of improvement.—The present approved project, that of 1885, provides for the removal to 25 feet depth at low water of a middle-ground shoal of about 30 acres area in Providence River opposite the city, no portion of the shoal within 200 feet of the harbor lines of the city to be removed by the General Government; all at a total cost estimated in 1885 at $112,346.

A plan of the works may be found at page 598, Annual Report of the Chief of Engineers for 1885, and pages 830 and 832 of 1893.

Amount expended and results to June 30, 1899.—The total amount expended on the present project up to June 30, 1899, was $103,917.74, by which 23.8 acres (out of the original 30) had been dredged to 25 feet depth, and a 16-foot depth had been secured over the remaining central and largest portions of the shoal, making an important addition to the anchorage facilities of the harbor.

Operations during the past fiscal year.—No funds were expended during the past fiscal year. No operations were in progress during the year, owing to the practical exhaustion of funds. Further work awaits further appropriations.

Work required to complete the existing project.—The work required to complete the existing project is the further deepening of the entire area to its full depth of 25 feet.

Operations contemplated for the fiscal year ending June 30, 1901.—Nothing contemplated, there being no funds available.

Green Jacket Shoal is in the collection district of Providence, which is a port of entry. The amount of revenue collected at Providence during the last calendar year was $314,686.13. The nearest light-houses are the six light-houses in Providence River. The nearest fortifications are Fort Adams, R. I., and Fort Greble, on Dutch Island.

Money statement.

July 1, 1899, balance unexpended	$332.26
July 1, 1900, balance unexpended	332.26
Amount (estimated) required for completion of existing project	8,096.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	8,096.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

Present project.

August 5, 1886	$26,250	August 18, 1894	$7,500
August 11, 1888	28,000	June 3, 1896	7,500
September 19, 1890	25,000		
July 13, 1892	10,000	Total	104,250

For the commercial statistics, see report of improvement of Providence River and Narragansett Bay, Rhode Island.

D 12.

IMPROVEMENT OF WICKFORD HARBOR, RHODE ISLAND.

Wickford Harbor is an arm of Narragansett Bay lying west of the north end of Conanicut Island, about 18 miles south of Providence and about 12 miles northwest of Newport, R. I. The entrance is obstructed by a number of bowlders and the harbor itself is shoal.

The harbor owes its importance to the fact that it is the water terminus of the Wickford Railroad, which connects with the New York, New Haven and Hartford Railroad at Wickford Junction, and, in connection with a ferryboat making six round trips daily between Wickford and Newport, forms the shortest line of communication between the latter point and New York and other points west.

The mean rise and fall of the tide is 4.2 feet.

Original condition.—Before improvement the channel had a ruling depth of about 6 feet at mean low water.

At the adoption of the present project the channel, extending from the steamboat wharf near the entrance to the harbor up to the wharves of the town of Wickford, was winding and about 6 feet deep, and the entrance to the harbor and the channel were obstructed by bowlders.

Plan of improvement.—The project of 1896 provides for removing certain of the worst bowlders and dredging a channel 60 feet wide and 9 feet deep at mean low water, with enlargements at the bends, up to the wharves in Wickford.

Amount expended and results to June 30, 1899.—The amount expended up to June 30, 1899, was $15,563.89, which removed some of the bowlders from the entrance to the harbor and completed the channel to the depth and width projected, i. e., of 60 feet width and 9 feet depth at mean low water up to the steamboat wharf.

Operations during the past fiscal year.—The work of removing the few additional bowlders at the entrance to the harbor was completed in December, 1899, by a diver and the use of a hired steam lighter, completing all work under the project.

Operations contemplated for the fiscal year ending June 30, 1901.—None, the present project being completed.

Wickford is in the collection district of Newport. The amount of revenue collected at Newport in the last calendar year was $6,767.98. The nearest light-house is Wickford Harbor light. The nearest fortification is Fort Greble, on Dutch Island, Rhode Island.

Money statement.

July 1, 1899, balance unexpended	$736.11
June 30, 1900, amount expended during fiscal year	736.11

AMOUNTS APPROPRIATED.

March 3, 1873	$5,000
June 23, 1874	5,000
June 3, 1896	6,300
Total	16,300

COMMERCIAL STATISTICS.

The commerce arriving and leaving Wickford Harbor, Rhode Island, by water during the calendar years ending December 31, 1896–1899, is estimated as follows (based mainly upon reports received from Mr. Thomas J. Pierce, town clerk, Wickford, R. I.):

Class of goods.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Cotton products	100	150	150	160
Tobacco	10	10	10	12
Rice	4	4	4	5
Grains and forage	750	950	1,000	1,200
Vegetables and truck	25	25	30	35
Live stock and products	125	200	200	200
Fish, oysters, etc	475	850	900	900
Naval stores	6	6	10	10
Lumber and products	2,014	2,200	2,500	3,200
Coal, mineral, etc	11,100	12,000	12,500	15,000
Fertilizer	50	50	60	65
General merchandise	200	350	350	375
Sundries	50	50	75	100
Total	14,909	16,845	17,789	21,262

New transportation companies established during the year, none.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	1,350	7	850
Fishing	50	6	50
Tugs	150	7	80
Pleasure boats	250	7	100
Sail:			
Freight	200	8	375
Fishing boats	300	3	5
Oyster boats	300	3	5
Pleasure boats, large	150	7	50
Pleasure boats, small	1,000	3	2
Barges	15	12	600

D 13.

IMPROVEMENT OF FALL RIVER HARBOR, MASSACHUSETTS.

Fall River Harbor lies at the mouth of Taunton River, in the northeastern angle of Mount Hope Bay, which empties into the ocean through Narragansett Bay and Sakonnet River. It forms the port of entry of Fall River, the largest cotton-manufacturing city in the United States, and its commerce is increasing yearly.

In 1895 Fall River had a population of about 90,000; the annual commerce of the port was estimated at 3,000,000 tons, and the value of the annual imports and exports exceeded $130,000,000.

The mean rise and fall of the tide is about 4.7 feet.

Original condition.—Before improvement, the reentrant north of the Old Colony Steamboat Company's wharf was limited to about 6 feet depth at mean low tide, and a considerable area of the harbor, especially in front of the upper wharves, carried much less depth of water than existed in the approaches.

At the adoption of the present project the proposed channel had a minimum depth of about 14 feet at mean low tide.

Plan of improvement.—The project of 1897, approved by the river and harbor act of March 3, 1899, provides for a channel 300 feet wide and 25 feet deep at mean low tide along the city front between the Old Colony wharf and deep water at the upper end of the city front, at an estimated cost of $58,060.47.

A description of the works may be found at page 727, Annual Report of the Chief of Engineers for 1895, and page 931 for 1897; also, the report of survey and map in House of Representatives Doc. No. 56, Fifty-fifth Congress, first session.

Amount expended and results to June 30, 1899.—The total amount expended up to June 30, 1899, was $30,000, which was expended between 1874 and 1878 in deepening a channel way in the reentrant north of the Old Colony wharf 160 feet wide to 12 feet depth at mean low tide, with an additional width of 100 feet deepened to 11 feet. A project was prepared for the expenditure of $20,000, appropriated in river and harbor act of March 3, 1899, and contract made, after advertisement according to law, with P. Sanford Ross, Incorporated, for dredging the new channel at 9 cents per cubic yard.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $19,997.40. The work of dredging in the new channel in front of the city wharves under the contract with

P. Sanford Ross, Incorporated, of Jersey City, N. J., was commenced July 31, 1899, and completed February 15, 1900. One hundred and ninety-three thousand five hundred and seventy-nine cubic yards of mud and sand were removed, and the lower reach of the channel was completed for the full width of 300 feet and depth of 25 feet at mean low water. A map of proposed harbor line was submitted under date of December 21, 1899, and approved under date of January 12, 1900, by the Secretary of War. A separate report is submitted on this subject.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Mr. Philip S. Spooner and George F. Cozzens as inspectors.

The survey for harbor line was under charge of Mr. C. M. Winchell as assistant engineer.

Work required to complete the existing project.—The work required to complete the existing project is dredging the upper portion of the new channel above the Old Colony dock.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to continue the dredging of the proposed new channel as appropriations are made by Congress.

Fall River Harbor is in the collection district of Fall River, which is a port of entry. The amount of revenue collected at Fall River in the last calendar year was $17,360.61. The nearest light-houses are Muscle Shoal, Bristol Ferry, and the light on the Flats opposite the city. The nearest fortification is Fort Adams, R. I.

Money statement.

July 1, 1899, balance unexpended	$20,000.00
June 30, 1900, amount expended during fiscal year	19,997.40
July 1, 1900, balance unexpended	2.60
Amount (estimated) required for completion of existing project	38,060.47
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	38,060.47
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

Previous project.

June 23, 1874	$10,000
March 3, 1875	10,000
August 14, 1876	10,000
Total	30,000

Existing project.

March 3, 1899	20,000

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
P. Sanford Ross, Incorporated	July 18, 1899	Aug. 1, 1899	May 31, 1900

COMMERCIAL STATISTICS.

The commerce arriving and leaving Fall River Harbor, Massachusetts, by water during the calendar year ending December 31, 1899, is estimated as follows (based mainly upon reports received from Mr. James Brady, collector of customs, and other citizens of Fall River):

Class of goods.	1898.	1899.
	Tons.	*Tons.*
Cotton and products	175,000	175,000
Lumber and products	100,000	100,000
Coal, minerals, etc	700,000	715,000
General merchandise	2,225,000	2,230,000
Total	3,200,000	3,220,000

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	700	12	2,500
Freight mainly	450	10	1,300
Passenger mainly	800	8	500
Tugs	400	7	80
Pleasure boats	300	7	100
Sail:			
Freight	400	10	175
Pleasure boats, large	300	6	10
Pleasure boats, small	1,500	3	3
Barges	700	12	500

D 14.

IMPROVEMENT OF NEWPORT HARBOR, RHODE ISLAND.

Newport Harbor is at the main entrance to Narragansett Bay. This bay during the entire year offers an easily accessible harbor of refuge for our European and coastwise commerce quite equal in almost every respect to any harbor on this coast. Newport Harbor, lying at the eastern entrance to this bay and forming a part of it, has been used by vessels from very early times, on account of its accessibility and well-sheltered location.

The objects of the improvement are to widen and deepen the entrance to the harbor and to enlarge its capacity for vessels seeking refuge in storms by increasing the area and depth of the anchorage within it. The mean rise and fall of the tide is about 3.75 feet.

Original condition.—Before improvement the capacity of the inner harbor was limited by shoals, and it was not sufficient for the vessels seeking it for refuge. The southern (main) entrance was obstructed by a bar which stretched out from Goat Island, and the northern entrance, near Rose Island, by a sharp rocky spit, and the general business wharves of the city could not be reached at low tide by vessels drawing more than 8 feet.

At the adoption of the present project this harbor was limited to 12 feet depth at low water, and its anchorage area too small for the craft which seek harborage at this place during the summer, and all the year during storms.

Plan of improvement.—The present approved project, that of 1880, as modified in 1882, 1883, 1884, 1890, and 1895, provides for the widening and deepening of the channel from Narragansett Bay into Newport, so as to secure 15 feet depth at low water, with at least 750 feet width; for the extension of the 13-foot depth and 10-foot depth anchorage basins, and for dredging a channel 10 feet deep along the harbor line south from Commercial Wharf to a point opposite the gas company's wharf; for the partial cutting off of the shoal spit at the southern end of Goat Island, and for the construction of jetties on the western shore of Goat Island, so as to protect the end of this island from erosion, and to prevent the drift of sand, etc., around the island into the adjacent parts of the channel and harbor, and for the removal of Spindle Rock, a sharp rocky spit near Rose Island; all at a total cost estimated in 1895 at $206,200.

A plan of the works may be found at page 604, Annual Report of the Chief of Engineers for 1885, and page 838 of 1893, and further details at page 562 of 1881, page 561 of 1882, page 494 of 1883, page 624 of 1884, page 736 of 1891, and page 627 of 1892.

Amount expended and results to June 30, 1899.—The amount expended to June 30, 1899, was $180,609.13. The $28,500 appropriated between 1873 and 1875 had been expended in dredging a 12-foot channel up to the city wharves and in building a small jetty to arrest the flow of sand into the main channel and harbor, and to protect the western side of Goat Island. This work was completed in 1876. Of the work under the present project, the 15-foot depth channel at the southern entrance to the harbor had been completed; the 10-foot depth channel along the harbor line south from Commercial Wharf to a point opposite the gas company's wharf, the cutting off of the spit at the southern end of Goat Island, and a jetty on the western side of the island had been nearly completed. The 13-foot depth anchorage area had been completed, a small part of the 10-foot anchorage area had been dredged, and 409.14 cubic yards of rock had been removed from Spindle Rock, near Rose Island, securing a depth of 8.5 feet at low water over the remaining portion of the rock.

Under date of March 31, 1899, a project for the expenditure of $15,000, appropriated in river and harbor act of March 3, 1899, was approved, which provides for deepening a small area near the dolphin on Goat Island and extending the 10-foot anchorage area. Specifications covering the above had been prepared and approved and the work advertised.

In July, 1897, a recommendation was submitted for a change in the harbor lines as established by the State in the harbor of Newport, R. I. The papers were returned to this office the same month with directions to arrange for a public hearing at Newport in regard to this matter, and said hearing was held on August 18, 1897, and report submitted thereon on September 11, 1897. Under date of September 24 instructions were received to make a resurvey of the water front of Newport Harbor, and said survey has been made and map platted. By Department instructions of December 10, 1897, the subject of establishment of harbor lines at Newport Harbor was referred to the board of engineers constituted by Special Orders, No. 44, Headquarters, Corps of Engineers, December 1, 1897, and directed that a public hearing be granted to all interested parties, and said hearing was held before said board on the 11th of January, 1898. Preliminary report was submitted on January 27, 1898.

The legislature of the State has from time to time authorized certain encroachments on the navigable area to individuals directly, as the waters of this locality are exempted from the jurisdiction of the State harbor board. In 1899 a wharf was built extending out into the harbor, based on a State act of four years previous, and in defiance of the United States acts bearing on the subject of navigable waters. The matter is now before the United States courts.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $14,709.50.

Proposals were received July 22 for dredging a small area near the dolphin at the southern end of Goat Island and in the 10-foot anchorage area, and a contract entered into, under date of August 7, 1899, with John H. Fenner, of Jersey City, N. J., at the rate of 11 cents per cubic yard. Work under this contract was commenced September 21, 1899, and completed May 1, 1900. A total of 97,833 cubic yards of gravel, clay, and mud and 14.51 cubic yards of bowlders exceeding 1 cubic yard each were removed, completing the area near the dolphin and the 10-foot anchorage area.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Mr. P. S. Knauer as inspector.

Work required to complete the existing project.—The work required to complete the existing project is the clearing up of shoal places in the harbor proper.

Operations contemplated for the fiscal year ending June 30, 1901.—Future operations are necessarily dependent upon Congressional action.

Newport is in the collection district of Newport and is a port of entry. The amount of revenue collected at Newport in the last calendar year was $6,767.98. The nearest light-houses are Lime Rock and Newport (Goat Island) lights. The nearest fortification is Fort Adams, R. I.

Money statement.

July 1, 1899, balance unexpended	$14,899.39
June 30, 1900, amount expended during fiscal year	14,709.50
July 1, 1900, balance unexpended	189.89
July 1, 1900, outstanding liabilities	180.53
July 1, 1900, balance available	9.36
Amount (estimated) required for completion of existing project	39,200.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	39,200.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

March 3, 1873	$8,500.00	September 19, 1890	$12,500.00
June 23, 1874	10,000.00	July 13, 1892	25,000.00
March 3, 1875	10,000.00	August 18, 1894	7,500.00
March 3, 1881	25,000.00	June 3, 1896	15,000.00
August 2, 1882	20,000.00	March 3, 1899	15,000.00
July 5, 1884	20,000.00	Received from sale of material	8.52
August 5, 1886	15,000.00		
August 11, 1888	12,000.00	Total	195,508.52

Abstract of proposals received and opened July 22, 1899, by Maj. D. W. Lockwood, Corps of Engineers, for dredging Newport Harbor, Rhode Island.

No.	Name and address of bidder.	Rate per cubic yard.
		Cents.
1	John P. Randerson, Albany, N. Y	27½
2	Cole Brothers, Fall River, Mass	25½
3	John H. Fenner, Jersey City, N. J	11
4	The Hartford Dredging Co., Hartford, Conn	27¾

Contract awarded to John H. Fenner.

Contract in force.

Contractor.	Date of approval.	To commence.	To complete.
John H. Fenner	Aug. 26, 1899	Sept. 1, 1899	a Mar. 1, 1900

a Extended to June 1, 1900.

COMMERCIAL STATISTICS.

The commerce arriving and leaving Newport Harbor, Rhode Island, by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from Mr. Martin H. Ball, deputy collector of customs, and other citizens of Newport, R. I.):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cotton and products	150	175	150	150	160	150
Tobacco	50	25	30	40	50	50
Grains and forage	1,000	850	1,500	2,000	2,000	2,500
Vegetables and truck	600	10,535	12,000	13,000	12,000	12,000
Live stock and products	2,400	40,281	45,000	45,000	45,000	45,000
Fish, oysters, etc	8,000	136,644	138,000	150,000	150,000	150,000
Naval stores	80	1,239	1,200	1,300	1,300	1,300
Lumber and products	13,260	13,000	15,000	21,000	28,000	31,000
Coal, minerals, etc	75,000	50,000	75,000	73,000	80,000	82,000
Fertilizers	125	250	300	400	730	900
Machinery	....	....	200	1,000	1,500	1,500
General merchandise	15,000	121,152	125,000	127,500	125,000	135,000
Sundries	3,000	....	500	500	500	700
Total	118,665	374,151	413,880	434,900	446,230	462,100

New transportation companies established during the year: None reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	1,400	12	1,500
Freight mainly	400	10	1,000
Passenger mainly	3,700	8	500
Fishing	500	7	160
Tugs	800	7	80
Pleasure boats	1,200	7	100
Sail:			
Freight	900	10	150
Fishing boats	750	6	20
Pleasure boats, large	1,800	6	10
Pleasure boats, small	2,800	3	3
Barges, freight	300	12	500

D 15.

HARBOR OF REFUGE AT POINT JUDITH, RHODE ISLAND.

Point Judith is the southeastern extremity of South Kingston, R. I., and marks the southwestern entrance to Narragansett Bay.

At the adoption of the present project this point was a specially dangerous place for boats and tows to pass during storms and even ordinarily bad weather.

Plan of improvement.—The present approved project, that of 1889, provides for the construction of a national harbor of refuge nearly a mile square at this point by means of stone breakwaters built partly on Squid Ledge and planned so as to give protection against easterly, southerly, and westerly storms, the mainland itself forming a protection on the north; all at a total cost estimated in 1889 at $1,250,000.

By the act of July 13, 1892, authority was given to the Secretary of War to make contracts for the completion of the project on the basis of the above estimated total cost, the work to be paid for as appropriations may from time to time be made by law.

A description of the works may be found at page 595, Annual Report of the Chief of Engineers for 1890, and a general plan of the same in House Ex. Doc. No. 66, Fifty-first Congress, first session, and page 840 of 1893.

Amount expended and results up to June 30, 1899.—The total amount expended on the present project up to June 30, 1899, was $1,242,288.19, by which the breakwater was built to a total length of 6,970 feet, a height of 10 feet above mean low water; width on top 20 feet; sea slope 1 on 2 to a depth of 12 feet below low water and thence to a slope of 1 on 1, and a harbor slope of 1 on 1. It incloses an area of about 1 square mile with 12 feet of water and about 0.92 of a mile with 18 feet of water, more than two-thirds of which is over 25 feet deep. Three beacon lights had been established and maintained on the breakwater.

The storms during the winter of 1896–97 carried off some of the top stones, but no serious damage had been done. On September 9, 1896, a severe gale, accompanied by an unusually high tide, visited this locality and caused considerable damage to the top of the breakwater. In consequence of the damage thus sustained a board of engineers was convened to consider and report upon the subject of the construction of the harbor of refuge at Point Judith, Rhode Island. The report of this board (see p. 920, Annual Report of the Chief of Engineers for 1897) recommends the raising of the crest of the eastern arm of the breakwater to 9 feet above high water, the present height being 6 feet, and the postponement of the construction of the detached eastern breakwater until after the completion of the main work may demonstrate the necessity or otherwise of such a structure for additional shelter.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $1,338.76.

Three small lights were maintained on the breakwater during the year. The harbor slopes of the breakwater were slightly damaged during a severe storm occurring on March 2 and 3, 1899. During the year 25 steamers, 147 schooners, 125 sloops, and 17 barges took refuge behind the breakwater.

Work required to complete the existing project.—The work required to complete the existing project is the raising of the crest of the eastern arm of the breakwater to 9 feet above high water, the present height being 6 feet, and extension of the western arm 1,980 feet.

The completion of the project as recommended by the Board of Engineers involves the placing of 310,533 tons of stone in addition to the amount already placed, which it is estimated will cost $444,311.

The eastern arm is completed, and the Board recommended that it be raised 3 feet; also that the western arm be extended to its projected length of 4,700 feet. This is regarded as necessary in order that the full results sought may be secured.

Operations contemplated for the fiscal year ending June 30, 1901.—The lights will be maintained. Future work depends on Congressional action.

Point Judith is in the collection district of Newport, which is a port of entry. The amount of revenue collected at Newport in the last calendar year was $6,767.98. The nearest light-house is Point Judith Light. The nearest fortification is Fort Greble, on Dutch Island, Rhode Island.

Money statement.

July 1, 1899, balance unexpended	$7,750.42
June 30, 1900, amount expended during fiscal year	1,338.76
July 1, 1900, balance unexpended	6,411.66
July 1, 1900, outstanding liabilities	121.26
July 1, 1900, balance available	6,290.40
Amount (estimated) required for completion of existing project	444,310.98
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	444,310.98
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

September 19, 1890	$75,000.00
July 13, 1892	75,000.00
March 3, 1893	100,000.00
August 18, 1894	100,000.00
March 2, 1895	300,000.00
June 11, 1896	300,000.00
June 4, 1897	300,000.00
	1,250,000.00
Received from sale of material	38.61
Total	1,250,038.61

COMMERCIAL STATISTICS.

The tonnage of vessels passing Point Judith, Rhode Island, during the calendar years ending December 31, 1895–1898, is estimated as follows (based mainly upon reports received from Mr. Asa Church, keeper Point Judith Life-Saving Station, Rhode Island):

Class of vessels.	1895.	1896.	1897.	1898.
	Gross tons.	*Gross tons.*	*Gross tons.*	*Gross tons.*
Steamers (freight and fish)	6,000,000	6,000,000	6,400,000	7,000,000
Yachts (steam and sail)	700,000	700,000	700,000	700,000
Schooners (2, 3, and 4 masts)	20,400,000	21,400,000	21,500,000	21,500,000
Ships, barks, and barkentines	180,000	180,000	180,000	180,000
Brigs and brigantines	60,000	60,000	60,000	60,000
Sloops	40,000	40,000	40,000	40,000
Barges	4,840,000	5,000,000	5,100,000	5,200,000
Total	32,220,000	33,380,000	33,980,000	34,680,000

NOTE.—No response was received to request for statistics for the year 1899, but from information at hand they are not believed to vary materially from those of the previous year.

D 16.

IMPROVEMENT OF ENTRANCE TO POINT JUDITH POND, RHODE ISLAND.

Point Judith Pond is a shallow salt pond, lying in rear of the sandy beach of the Rhode Island shore, just west of Point Judith.

The improvement desired at this place by the people of the neighborhood is the reopening of an old entrance long ago closed by the ocean storms.

The present entrance to this pond is very shallow (less than 3 feet), crooked, and variable in location, and lies about a mile to the westward of the former entrance (now closed), where the improvement is desired.

Plan of improvement.—There is at present no approved project for this work, it having been reported as not worthy of improvement in 1873 by General Warren (pp. 286–289, Part II, Annual Report of the Chief of Engineers for 1874, and House Ex. Doc. No. 84, Forty-third Congress, first session), and also in 1888 by Major Livermore (pp. 642–643, Annual Report for 1889), and also in 1893 by Captain Bixby (see pp. 841 and 879, Annual Report for 1893). The appropriation for 1894 orders that all money so far appropriated shall be used in improving the former entrance to said pond.

Amount expended and results to June 30, 1899.—The total amount expended on this work up to June 30, 1899, was $518.38, by which a survey of the locality had been made. A report of this survey, with estimate and project, was submitted July 2, 1895, and printed at page 689, Annual Report of the Chief of Engineers for 1895, and by direction of the Secretary of War further action was delayed until the subject can again be considered by Congress. No field work has yet been done except in the way of examination and survey.

Operations during the past fiscal year.—No work done and no funds expended during the past fiscal year.

Operations contemplated for the fiscal year ending June 30, 1901.—No work contemplated for the fiscal year ending June 30, 1901.

Point Judith Pond is in the collection district of Newport, which is a port of entry. The amount of revenue collected at Newport in the last calendar year was $6,767.98. The nearest light-house is Point Judith Light. The nearest fortification is Fort Greble, on Dutch Island, Rhode Island.

Money statement.

July 1, 1899, balance unexpended	$9,481.62
July 1, 1900, balance unexpended	9,481.62

AMOUNTS APPROPRIATED.

July 13, 1892	$7,500
August 18, 1894	2,500
Total	10,000

For the commercial statistics, see harbor of refuge at Point Judith, Rhode Island.

D 17.

HARBOR OF REFUGE AT BLOCK ISLAND, RHODE ISLAND.

This island is part of the State of Rhode Island; is 14 miles east of Montauk Point, the eastern end of Long Island, and is about 10 miles from the nearest point of the mainland. Besides supplying the wants of the mackerel-fishing fleet and the general coast navigation, the island is an important point on our shores for ocean navigation. It has a signal station connected by submarine telegraph with the mainland. Vessels are passing the island at all times and on all sides of it, and its position renders it of national importance. The object of the improvement is to furnish a harbor of refuge for medium-draft vessels engaged in foreign and coastwise commerce. The mean rise and fall of the tide is about 3 feet.

Original condition.—Before the construction of the present harbor of refuge Block Island had no harbor which afforded protection for decked vessels. The only vessels used were open boats, which on the approach of storms were hauled up on the beach by oxen. The largest of these boats were of about 10 tons burden.

Plans of improvement.—Between 1870 and 1876, $285,000 was appropriated to build a breakwater for a harbor for medium-draft vessels. This work, including an inner harbor of 7 feet depth for temporary use of the Government plant, was completed in 1878. (See p. 202 of Annual Report for 1877 and p. 313 of 1879.)

In 1880, $6,000 was appropriated for dredging the inner basin to 9 feet depth. This work was completed in 1881. (See p. 390 of Annual Report for 1880 and p. 563 of 1881.)

In 1882, $19,000 was appropriated for building a sea wall on the east side of the inner basin and protecting the cliffs on the east side of breakwater. (See p. 563 of Annual Report for 1882.) This work was completed in 1884.

In 1884, $15,000 was appropriated for additions to the old breakwater. (See p. 628 of Annual Report of 1884.) These additions were made in 1884–85, partially closing a gap in this old breakwater.

The project of 1884, as modified in 1888, provided for the construction of a harbor of refuge on the eastern side of the island, consisting of an enlarged inner harbor (or basin) for small vessels and an exterior harbor for large ones. The basin was to be about 800 feet square and completely inclosed except at its 100-foot-wide entrance. The exterior harbor was already formed by an old breakwater on the east and the adjacent shore on the south and west, but an old gap near the end of this breakwater was to be filled up. The project covered the construction of the stone sea walls of the enlarged inner harbor ($46,000), the repair of the old breakwater ($24,000), and a little dredging ($5,000) along the western side of the old breakwater and also inside the harbor; all at a total cost estimated in 1888 at $75,000. This project was practically completed in 1893.

The present approved project, that of 1895, based on the report of the survey ordered in the river and harbor act of August 18, 1894, provides for raising the entire breakwater to proper height, stopping sand leaks between certain points, and dredging the main inner harbor to a depth of 10 feet, at an estimated cost of $83;985.

A plan of the works may be found at page 612, Annual Report of the Chief of Engineers for 1885, page 844 of 1893, and in House Doc. No. 83, Fifty-fourth Congress, first session; and further details at pages 609 and 613 of 1885 and page 506 of 1888.

Amount expended and results up to June 30, 1899.—The total amount expended up to June 30, 1899, was $404,487.73, by which the gap in the old breakwater had been filled up so as to make the breakwater of 1,900 feet total length; the sea walls of the inner harbor had been completed, except as to stone fender piers at the entrance; wooden fender piers had been built for present uses, the worst rocks and bowlders had been removed from the new inner harbor, and a small amount of dredging had been done from time to time at the entrance to the inner harbor, where a shoal was constantly forming.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $8,088.38.

Proposals for repairing and strengthening the north breakwater of the enlarged inner harbor were received July 10, and a contract entered into under date of August 1, 1899, with John Beattie, of Leete Island, Conn., at the rate of $2.25 per ton of stone in place.

Work under this contract was commenced in August and completed November 4, 1899. A total of 2,901.73 tons of stone were put in place. Proposals for dredging about 5,000 cubic yards of sand from the entrance to the inner harbor were received May 1, 1900, and contract entered into with Cole Brothers, of Fall River, Mass., under date of May 12, 1900. Work under this contract was commenced June 7 and completed June 14. Five thousand five hundred cubic yards were removed, giving 10 feet of water at mean low tide in the channel.

Under present conditions the entrance to the harbor is liable to shoal up each year, by reason of sand carried through the main breakwater during easterly storms. This will continue until the breakwater is made sand tight, as provided for in project of 1895; but in order to carry this work on properly and economically sufficient money should be appropriated to complete this part of the project in one season. Otherwise, unless the necessary funds are provided for maintaining the channel at the entrance by dredging it out each year, at a cost of about $2,500, it will close up and the inner harbor become practically useless except for boats of a very light draft. Under present conditions the annual cost of maintaining a channel into the inner harbor is estimated at $2,500 for dredging.

Lights have been maintained at the entrance to the inner harbor during the year.

This work was in the local charge of Mr. Edward Parrish, as assistant engineer, with Messrs. Kneeland P. Partelow and P. S. Spooner as inspectors.

During the winter of 1898 and 1899 the north wall of the inclosed harbor was seriously damaged by storms, and a project for repairing and strengthening it was approved under date of May 6, 1899, using part of the amount appropriated in river and harbor act of March 3, 1899.

Work required to complete the existing project.—The work required to complete the existing project is to repair the main breakwater and stop sand leaks through certain portions of it, repair and strengthen the west breakwater of the enlarged inner harbor, dredge the enlarged inner harbor to a depth of 10 feet at mean low water, and remove the crib work of the small inner harbor originally built to protect Government plant.

Operations contemplated for the fiscal year ending June 30, 1901.—Future operations will depend upon appropriations made by Congress.

Block Island is in the Newport collection district, and Newport is the nearest port of entry. The revenue collected at Newport during the last calendar year was $6,767.98. There is no duty collected at Block Island. The value of the harbor is mainly as a harbor of refuge. There are several lights on the island. The nearest fortification is Fort Greble, Rhode Island.

Money statement.

July 1, 1899, balance unexpended	$12,012.27
June 30, 1900, amount expended during fiscal year	8,088.38
July 1, 1900, balance unexpended	3,923.89
July 1, 1900, outstanding liabilities	1,790.56
July 1, 1900, balance available	2,133.33
Amount (estimated) required for completion of existing project	78,985.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	78,985.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

July 11, 1870	$30,000	August 5, 1886	$20,000
March 3, 1871	75,000	August 11, 1888	15,000
June 10, 1872	50,000	September 19, 1890	15,000
March 3, 1873	50,000	July 13, 1892	24,000
June 23, 1874	20,000	August 18, 1894	2,500
March 3, 1875	20,000	June 3, 1896	5,000
August 14, 1876	40,000	March 3, 1899	10,000
June 14, 1880	6,000		
August 2, 1882	19,000	Total	416,500
July 4, 1884	15,000		

Abstract of proposals received and opened July 10, 1899, by Maj. D. W. Lockwood, Corps of Engineers, for repairing breakwater at Block Island Harbor, Rhode Island.

No.	Name and address of bidder.	Rate per ton of 2,000 pounds.
1	John Beattie, Leetes Island, Conn	$2.25
2	Eugene S. Belden, Hartford, Conn	2.48

Contract awarded to John Beattie.

Abstract of proposals received and opened May 1, 1900, by Maj. D. W. Lockwood, Corps of Engineers, for dredging Block Island Harbor, Rhode Island.

No.	Name and address of bidder.	Rate per cubic yard.
		Cents.
1	Cole Brothers, Fall River, Mass	32
2	T. A. Scott, jr., New London, Conn	55

Contract awarded to Cole Brothers.

Contracts in force.

Contractor.	Date of approval.	To commence.	To complete.
John Beattie	Aug. 25, 1899	Aug. 15, 1899	Dec. 31, 1899
Cole Brothers	May 22, 1900	May 29, 1900	June 29, 1900

COMMERCIAL STATISTICS.

The commerce arriving and leaving Block Island, Rhode Island, by water during the calendar years ending December 31, 1894–1899, is estimated as follows (based mainly upon reports received from local parties):

Class of goods.	1894.	1895.	1896.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Cotton and products	5	....	10	10	10	12
Tobacco	30	30	30	32	32	30
Rice	10	10	12	12	13	12
Grains and forage	1,050	1,130	1,250	1,300	2,300	2,400
Vegetables and truck	480	515	650	650	700	800
Live stock and products	1,100	2,100	2,500	2,600	2,700	2,800
Fish, oysters, etc	10,250	10,050	15,000	15,000	15,500	16,000
Naval stores	10	5	10	10	10	10
Lumber and products	4,100	7,000	6,500	6,500	6,500	7,000
Coal, minerals, etc	10,000	8,650	15,000	15,000	14,000	14,500
Fertilizers	130	150	200	300	350	375
Machinery	....	....	100	100	100	125
General merchandise	7,000	6,625	6,600	6,700	6,700	6,800
Sundries	9,000	8,870	2,500	3,500	4,000	4,200
Total	43,165	45,135	50,362	51,714	52,915	55,064

New transportation companies established during the year, none reported. The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	800	7	500
Passenger mainly	100	7	300
Fishing	600	7.5	130
Tugs	400	7.5	135
Pleasure boats	600	7	125
Sail:			
Freight	300	9	150
Oyster boats	200	7	30
Pleasure boats, large	900	8	15
Pleasure boats, small	1,500	5.5	7
Barges	30	10	350
Fishing boats	6,500	7	30

D 18.

IMPROVEMENT OF GREAT SALT POND, BLOCK ISLAND, RHODE ISLAND.

Block Island is about 12 miles south of Point Judith and 15 miles northeast of Montauk Point; it is about 5 miles long, with an average width of 2 miles; has a population of 1,300, and the valuation of ratable property, as returned by the board of assessors for 1896, was as follows: Real estate, $614,275; personal estate, $114,850; total, $729,125. About midway of the island north and south is a salt-water pond, known as the Great Salt Pond. Its water surface covers 700 acres, about 150 acres of which has a depth of 18 feet and over.

Plan of improvement.—The conversion of this pond into a harbor of refuge by making a channel through the sand strip separating it from the sea on the west side of the island was reported against by Maj. D. C. Houston, Corps of Engineers, under date of January 15, 1868, and again by Capt. W. H. Bixby, Corps of Engineers, under date of June 12, 1893, and Col. Henry L. Abbot, Corps of Engineers, under date of June 15, 1893.

The river and harbor act of August, 1894, provided for a survey of "Great Salt Pond, Block Island, with a view to making harbor of refuge therein." The duty of making this survey was assigned to Col. S. M. Mansfield, Corps of Engineers, and his report is dated October 8, 1895. At the time of this survey work was in progress, under appropriations made by the State of Rhode Island and town of New Shoreham, on a channel connecting the pond with the ocean. Its condition at the time is fully given in the report of Colonel Mansfield. A jetty 425 feet long had been built, and up to September 1, 1895, 268,038 cubic yards of material had been removed from the cut.

In his report Colonel Mansfield states as follows:

> I assume that the channel of entrance should have at least a central depth of 25 feet and be of ample width, and on the accompanying chart I have projected such a channel through the center 150 feet wide, thence gradually shoaling to 12 feet in a width of 504 feet, and thence to high-water line, with a slope of 1 on 4. The total width at low water will be 600 feet.

The above plan was authorized by Congress in the river and harbor act of June 3, 1896, which contained the following item: "Improving harbor, Great Salt Pond, Block Island, Rhode Island, in accordance with the report of November 29, 1895," which was the date of the letter of the Chief of Engineers transmitting Colonel Mansfield's report to the Secretary of War.

Colonel Mansfield estimated the cost of the improvement at $97,567.94 in addition to the amounts appropriated by the State and town, but this estimate did not include revetting the banks through the beach, and the cost of dredging was figured at 10.7 cents per yard, which was the price being paid by the State and town at the time of the survey.

In April, 1899, a survey was made of the locality, and on June 8, 1899, I had the honor to submit a special report with revised estimate of the cost of completion of this project, of which the following is an extract:

> The work remaining to be done to complete the project submitted by Colonel Mansfield in 1895, and upon which Congressional action has to be based, is as follows:

North jetty to 12-foot contour, including riprapping through beach	$35,000
Dredging 470,000 cubic yards from channel, at 16 cents per cubic yard	75,200
Total	110,200
Contingencies	11,020
	121,220
Less appropriation of March 3, 1899	50,000
	71,220

> But a comparatively small amount of stone has been placed in the north jetty started by the State and town, and on this account, and for the additional reason that the amount of dredging for the 720-foot channel over that required for the 600 feet wide channel would more than offset this, I would recommend that a new north jetty be built, limiting the width of channel to 600 feet.
>
> The dredging that has been done already has not apparently left the bottom even, as a line parallel to the south jetty and almost any distance up to 400 feet from it will show. Bowlders of varying sizes have been encountered, and some of the large ones have been left, so that 12 feet depth can not be carried into the pond generally, except under a competent pilot. * * *
>
> In 1895 dredging in this locality cost 10.7 cents per cubic yard, but this was principally inside work. Since then dredging has cost 14⅞ cents per cubic yard, and as the digging gets deeper, clay and bowlders are met with, so that I do not regard 16 cents per cubic yard as too high.

This revised estimate was approved under date of July 20, 1899.

In a report on this harbor dated May 4, 1900, I stated that—

> Owing to changes that have taken place since the survey upon which the estimate of cost of completion was based, I do not regard the estimate of June 8, 1899, and which was published in the Annual Report of the Chief of Engineers for that year as reliable.

This statement was based upon changes observed in the general condition of affairs, and particularly those produced by the storm of March 2 and 3 of this year, during a period of exceptionally high tides. The winds varied from NW. to SW. The height of the south jetty is 5 feet above mean high water, and on the occasion mentioned the seas went over the breakwater into the channel and across the beach sufficiently to partially undermine the oil house belonging to the Light-House Establishment and carrying sand into the channel. The giving way of the outer end of the jetty was due to its being undermined, the cut being from 7 to 8 feet in water that was 18 to 19 feet deep when the head of the jetty was completed, while in advance of the jetty the shoaling amounted to from 6 to 8 feet and extended out a distance of 250 feet. There was some shoaling in the channel, but in less degree.

The low-water shore line on south side of south jetty has advanced 190 feet since the survey of April, 1899, was made, and the sand has been raised back of it so that it is now even with the top of the breakwater and is being carried into the channel when the wind is from south around to west.

It would appear from the foregoing that it will be necessary within a short time to prolong the south jetty, and also to raise it or else resort to sand fences to keep the sand out of the channel.

There is no question in my mind but that if the north jetty is built as planned and the jetties are extended by revetments through to the pond, the depth of the channel between them will be maintained by the tidal flow, at least for a long time; trouble, however, is to be anticipated beyond the jetty ends in the ocean and in the pond. Where the openings widen out, the current diminishes rapidly, and such material as has been carried along by it is deposited. In the small harbors on the Cape Cod coast where attempts have been made to deepen and hold a channel by revetments and jetties the results have always been the same. The channels could be deepened and held between the jetties and revetments, but beyond them inside and outside there were crescent-shaped bars which materially lessened the navigable depth. In these small harbors the results were accomplished in a comparatively short time. In a case like that at the Salt Pond, where the depths are greater, deterioration in depth would be slower on account of the large volume and greater force of the tidal flow. There appears to be a movement of sand along the west shore of the island toward the north, as is evidenced by the long sand spit at the north end of the island and the steady advance seaward of the shore line on the south side of the south jetty. Whether this shore line will eventually reach the end of the jetty or not, experience this spring has shown that under certain conditions there is an erosive current around the outer end of the south jetty, and a deposit of sand in advance of it that projects over into the channel way; as a matter of fact, the United States inspector states that to obtain 18 feet depth dredging is necessary 150 feet outside of the 18-foot contour shown on the map of survey of April, 1899. During a southwester the water on the south side and outer end of the south jetty and northward across the channel is discolored with sand.

Dredging in advance of the south jetty can afford but temporary relief, as, owing to the fact that the prevailing winds are from the southwest, there is an almost continual motion of sand along the shore and across the entrance in advance of the jetties.

On the map herewith I have indicated an extension to the south jetty amounting to 350 feet and extending over the 14-foot shoal to deep water beyond. The north jetty is shown with an extension of 600 feet beyond what is provided for in the approved project. If extended farther its outer end would catch the drift along the shore.

I am of the opinion that the better plan in the first place would have been to have built the jetties normal to the general trend of the shore instead of inclined to it, for the reason that less dredging would have been required and the jetties themselves would have been shorter; besides, under the present arrangement the south jetty acts as a training wall for the littoral current, and the sand moved by it is carried out to the end of the jetty and deposited there. Prolonging this jetty will merely move this shoal farther out.

Estimate of cost.

Extending south jetty 350 feet, 38,000 tons rock, at $1.50 per ton	$57,000	
Extending north jetty 600 feet beyond present project, 35,000 tons rock, at $1.50	52,500	
		$109,500
North jetty and revetment as per project of June 8, 1899	35,000	
Dredging 250,000 cubic yards, at 16 cents per yard	40,000	
Sand fences	2,500	
		77,500
		187,000
Engineering, inspection, and office contingencies, 15 per cent		28,000
Total		215,000

The above is in addition to amounts already appropriated.

The cost of maintenance is indeterminate at present.

This project and estimate was approved under date of June 15, 1900.

The conversion of one of the small ponds near the dock into an inner harbor is now in progress under appropriations made by the State of Rhode Island and town of New Shoreham.

Amount expended and results up to June 30, 1899.—The total amount expended on this project by the Government up to June 30, 1899, was $39,927.77, by which 26,901 tons of stone had been placed in the south jetty, extending the same to the 18-foot contour, 1,262 feet from shore, and in dredging 10,756 cubic yards in channel through the breach. A survey was made in April, 1899, to determine condition of the channel entrance with a view to preparation of project for expenditure of appropriation of $50,000 in river and harbor act of March 3, 1899.

Operations during the past fiscal year.—The amount expended during the past fiscal year was $11,184.24.

Proposals were received September 15 for dredging a channel 300 feet wide and 18 feet deep at mean low water in the entrance to the Great Salt Pond, and a contract entered into under date of November 15, 1899, with John P. Randerson, of Albany, N. Y., at the rate of 14½ cents per cubic yard; work to commence November 20, 1899, and be completed October 1, 1900.

Under this contract the work of dredging commenced December 12, 1899, and was in progress at the close of the fiscal year; 79,763 cubic yards of sand, clay, and cobblestones, and 69.1 cubic yards of bowlders in excess of 1 cubic yard each were removed during the year.

A small amount of damage was done to the jetty on the south side of the channel by a severe storm on March 2 and 3. Proposals for furnishing riprap stone and repairing the jetty were received May 15, 1900, and a contract entered into under date of May 23 with the estate of John Beattie, of Leete Island, Conn., at the rate of $1.40 per ton.

Work under this contract was commenced June 16, and was in progress at the close of the fiscal year; 705.928 tons were put in place.

Proposals were received June 30, 1900, for dredging the central portion of the entrance channel to a depth of 25 feet at mean low water.

This work was in the local charge of Mr. Edward Parrish as assistant engineer, with Mr. Henry F. Hill as inspector.

Work required to complete the existing project.—The deepening and widening of the channel, the extension of the south jetty, and the construction of the north jetty 600 feet from the south jetty and parallel to it, as provided for in approved project.

Operations contemplated for the fiscal year ending June 30, 1901.—It is proposed to apply the available funds to dredging.

Great Salt Pond is in the Newport collection district, and Newport is the nearest port of entry. The revenue collected at Newport during the last calendar year was $6,767.98. There is no duty collected at this place. The value of the harbor is mainly as a harbor of refuge. There are several light-houses at the island. The nearest fortification is Fort Greble, R. I.

Money statement.

July 1, 1899, balance unexpended		$50,072.23
June 30, 1900, amount expended during fiscal year		11,184.24
July 1, 1900, balance unexpended		38,887.99
July 1, 1900, outstanding liabilities	$5,632.09	
July 1, 1900, amount covered by uncompleted contracts	13,715.05	
		19,347.14
July 1, 1900, balance available		19,540.85
Amount (estimated) required for completion of existing project		215,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		100,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

June 3, 1896	$40,000
March 3, 1899	50,000
	90,000

Abstract of proposals received and opened September 15, 1900, by Maj. D. W. Lockwood, Corps of Engineers, for dredging Great Salt Pond Harbor, Block Island, R. I.

No.	Name and address of bidder.	Rate per cubic yard.
		Cents.
1	John P. Randerson, Albany, N. Y	14¼
2	Alonzo E. Smith, Islip, L. I	24
3	Morris & Cumings Dredging Co., New York City	13 7/16
4	W. H. Beard Dredging Co., New York City	17 9/16
5	Hartford Dredging Co., Hartford, Conn	16 7/16
6	The International Contracting Co., New York City	16

Contract awarded to John P. Randerson; the lowest bid, that of Morris & Cumings Dredging Company, being informal.

Abstract of proposals received and opened May 15, 1900, by Maj. D. W. Lockwood, Corps of Engineers, for repairing south jetty at Great Salt Pond, Block Island, R. I.

No.	Name and address of bidder.	Rate per ton of 2,000 pounds in place.
1	Eugene S. Belden, Hartford, Conn	$1.57
2	Estate of John Beattie, Leete Island, Conn	1.40

Contract awarded to estate of John Beattie.

Abstract of proposals received and opened June 30, 1900, by Maj. D. W. Lockwood, Corps of Engineers, for dredging entrance to Great Salt Pond Harbor, Block Island, R. I.

No.	Name and address of bidder.	Rate per cubic yard.
		Cents.
1	The W. H. Beard Dredging Co., New York, N. Y	30
2	John P. Randerson, Albany, N. Y	29¾

Contract recommended to be awarded to John P. Randerson.

Contracts in force.

Contractor.	Date of approval.	To commence.	To complete.
John P. Randerson (dredging)	Nov. 28, 1899	Nov. 20, 1899	Oct. 1, 1900
Estate of John Beattie (repairing jetty)	June 13, 1900	June 20, 1900	July 20, 1900

COMMERCIAL STATISTICS.

The commerce arriving and leaving the Great Salt Pond, Block Island, R. I., by water during the calendar year ending December 31, 1899, is estimated as follows (based upon the most reliable information obtainable):

Class of goods.	1899.
Grains and forage	300
Fish	1,000
Lumber	500
Coal	2,000
General merchandise	300
Total	4,100

New transportation companies established during the year: None reported.

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	200	9	500
Passenger mainly (excursions)	12	9	500
Fishing	200	10	25
Tugs	10	8	50
Pleasure boats	500	10	100
Sail:			
Freight	500	7	160
Fishing boats	2,000	10	60
Pleasure boats	1,000	6	20
Barges	10	9	300

D 19.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Wrecks of schooners Lunet, Hector, J. D. Ingraham, Nellie Doe, and E. C. Willard.—These wrecks were lost during the gale of November, 1898, and were reported to the Department as obstructions to navigation in October, 1899, and an allotment made for their removal, in November.

The *Lunet* was sunk in Vineyard Sound in about 7 fathoms of water, 1½ miles southwest of the black buoy at Tarpaulin Cove, and the others were sunk in Vineyard Haven Harbor.

The *J. D. Ingraham* and *Nellie Doe* were not removed by the Government wrecking force, for the reason that they were purchased by private parties from their owners and transferred to a point near the marine railway, to be hauled out and repaired.

The work of removing the wrecks of the other vessels was commenced in January and completed in February, by the use of the Government diving plant and a hired schooner.

The total cost of this work was $1,898.26, and the unused funds have been covered into the United States Treasury.

D 20.

PRELIMINARY EXAMINATION OF BASS RIVER HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 142, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit herewith a copy of report of August 18, 1899, by Maj. D. W. Lockwood, Corps of Engineers, of the results of a preliminary examination of Bass River Harbor, Massachusetts, made to comply with provisions of the river and harbor act approved March 3, 1899.

It is the opinion of the local officer, concurred in by Col. G. L. Gillespie, Corps of Engineers, Division Engineer, and by me, that the locality is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

United States Engineer Office,
Newport, R. I., August 18, 1899.

General: The preliminary examination of Bass River Harbor, Massachusetts, provided for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor, after a personal examination of the locality, to submit the following report in connection with it:

The river and harbor act of August 18, 1894, provided for a preliminary examination of this locality, and under date of May 31, 1895, Maj. W. H. Bixby, Corps of Engineers, made an exhaustive report on

Bass River, giving in great detail everything of interest bearing on the subject. (See Annual Report, Chief of Engineers, U. S. Army, 1895, pp. 739 to 743, inclusive.) The following description of the locality is taken from Major Bixby's report:

> Bass River is one of the small rivers on the south shore of Cape Cod Bay, between Hyannis and Chatham, and empties into Nantucket Sound about 5 miles east of Hyannis. * * * From the apparent mouth of the river to its outer bar in Nantucket Sound, i. e., to the deep water of Nantucket Sound, the distance is about 1.5 miles, measured along the boating channel, this channel, as marked by stakes (cut down by the ice each winter and replaced every spring), being from about 60 to 600 feet in width, the depth on the outer bar (a few hundred feet from deep water of the sound) being a little less than 2 feet; the distance from 3 feet depth outside of the bar to 3 feet depth inside the bar at low water being about 2,000 feet, and the distance from 6 feet depth outside the bar to 6 feet depth inside the bar at low water being from 5,000 to 6,000 feet. The bottom is everywhere of shifting sand, and the boat channel is continually changing its position from year to year.

The conditions, so far as the depths on the bar at the mouth of the river are concerned, are to-day about as they were when Major Bixby made his examination. Two small schooners, termed packets, attend to the commercial needs of the locality, crossing the bar in or out at high water, and delays are frequent and annoying undoubtedly, because the owners are liable to load to the limit of depth. As a business proposition the securing of deeper water might result at most in a slight reduction in cost of freight. There could be but little increase in the commerce, which is purely local, as the section to be affected is small and the manufacturing interests of little, if any, importance. The cost of any work to affect the depth of water on the bar would be great. Major Bixby estimated that to benefit the sailing packets a dredged channel 5,000 feet long and 6 feet deep at low water would be required, the sides being protected by suitable revetments.

In my opinion such a channel could not be kept open except at great expense, owing to the shifting sand along this part of the coast, as is evidenced by changes constantly going on. The breakwater to the east of the river mouth was designed to shelter an area about 10 feet deep between it and the shore, and furnish an anchorage for small vessels, but the effect has been to cause the filling up of the hole, and the breakwater is absolutely useless. This locality is, in my opinion, unworthy of improvement for the reason that the commercial interests involved are very small and purely local, with no prospect of any material increase in the future.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON.
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 21, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

The river and harbor act approved March 2, 1829, appropriated $150 for making survey of this locality, and the acts of July 4, 1836, and July 7, 1838, appropriated in the aggregate $20,000 for improvement.

Under these appropriations a breakwater was built outside the mouth 250 feet long, to serve as shelter for vessels drawing from 6 to 12 feet of water. In 1854-55 the Light-House Department lighted the breakwater.

Existing depths within and without the mouth are small, the cost of affording increased relief to commerce will be large, and annual appropriations will be required for maintenance.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

D 21.

EXAMINATION AND SURVEY OF HARBOR AT HYANNIS, MASSACHUSETTS.

[Printed in House Doc. No. 79, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 2, 1899.

SIR: I have the honor to submit the accompanying copy of reports dated August 19 and November 27, 1899, with map,[1] by Maj. D. W. Lockwood, Corps of Engineers, on preliminary examination and survey, respectively, of harbor at Hyannis, Mass., made to comply with requirements of the river and harbor act of March 3, 1899.

This locality is now being improved under a project adopted in 1884, which provided for the dredging to a depth of 15½ feet an area of 36 acres, with a view to enlarging the then existing harbor of refuge to that extent; but, as stated in these reports, less than one-half of this work has been done.

Major Lockwood considers the locality to be worthy of improvement to the extent of completing the dredged area projected in 1884, which he estimates will require the removal of 130,000 cubic yards of material, at a cost of $32,500, and Col. G. L. Gillespie, Corps of Engineers, the Division Engineer, recommends the improvement of the harbor to the extent proposed.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF HARBOR AT HYANNIS, MASSACHUSETTS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., August 19, 1899.

SIR: The preliminary examination of harbor at Hyannis, Mass., provided for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor, after a personal examination of the locality, to submit the following report:

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[1] Not reprinted. Printed in House Doc. No. 79, Fifty-sixth Congress, first session.

The harbor of Hyannis is situated on the south shore of the peninsula of Cape Cod, about 15 miles to the westward of the heel of the cape.

Between 1827 and 1838 a breakwater of riprap granite 1,170 feet long was constructed, covering an anchorage of about 175 acres, the entrance to which had a depth of about 15.5 feet.

In 1884 a survey of the locality was made and a project approved for deepening the anchorage area in rear of the breakwater to 15.5 feet over about 36 acres; this was rendered necessary by the deeper draft of vessels using the anchorage; 26.6 acres of the above area have been dredged to the required depth, leaving 9.4 acres to be completed.

In all probability this dredged area has shoaled somewhat, and it is a matter of some importance to determine its present condition. I regard the locality as worthy of improvement only to the extent of maintaining the dredged area projected in 1884 for purposes of refuge, and would recommend a resurvey of it at a cost of $300.

There is a wharf belonging to the New York, New Haven and Hartford Railroad Company, where wharfage rates are charged, built out from shore abreast of the east end of the breakwater, and under date of November 26, 1897, authority was granted by the Secretary of War to use the balance of funds then on hand in dredging a channel to this wharf. Two cuts were made, giving a width of about 50 feet and a depth of 14 feet. I understand that the depth has shoaled to about 12 feet, which was to be expected, as the movement of sand is across the cut, and that vessels have always had trouble passing through it loaded.

There are no tugs in this part of the country, and vessels go into and out from the dock under sail. A cut of the above description is not navigable for sailing vessels except under the most favorable circumstances, and as vessels always load to the maximum depth, delays are frequent. For this reason the cut has been of but little service and will never be of much service without the presence of a tug. I do not consider this feature of the situation as worthy of improvement.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 21, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer respecting this locality, and recommending that a survey be made of the dredged area projected in 1884, at a cost of $300.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 23, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of harbor at Hyannis, Mass.

I recommend that a survey be made, after which a more reliable opinion can be formed as to the scope of the improvement justified by the commercial interests involved.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

SURVEY OF HARBOR AT HYANNIS, MASSACHUSETTS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., November 27, 1899.

SIR: The river and harbor act of March 3, 1899, provided for a preliminary examination of harbor at Hyannis, Mass. A preliminary report, recommending a resurvey of the locality, was submitted under date of August 19, 1889. The duty of making the survey and report connected therewith having been assigned to me, I have the honor to submit the following:

A harbor of refuge was established at this point between 1827 and 1838 by the construction of a breakwater 1,170 feet long, which protected an area of about 175 acres from southerly storms. The depth of entrance was 15.5 feet. The harbor was designed to protect the fishing fleet and coasting vessels passing through Nantucket Sound. From 1852 to 1881 various sums were appropriated for repairing and strengthening the breakwater, so that altogether the sum of $123,431.20 was appropriated up to and including 1881, the largest amount appropriated in any one year being $12,000 and the smallest $2,500.

The draft of vessels having increased in the meantime, in 1884 a survey was made and project submitted and approved for deepening a part of the anchorage so as to extend the 15.5-foot area. The estimated cost of this extension was $45,743.20, but the small appropriations and other conditions operating against economy have largely increased the cost per cubic yard over what was estimated originally, so that less than one-half of the work has been done. It is estimated that to complete the project of 1884 130,000 cubic yards of material will have to be removed.

130,000 cubic yards, at 25 cents	$32,500

As this is strictly a harbor of refuge, the commercial statistics in connection with it would refer only to vessels seeking shelter, and I have no means of knowing the number that do this yearly. A tracing of the map of survey is forwarded this day in a separate package.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, November 28, 1899.

Respectfully forwarded to the Chief of Engineers, recommending that the project of 1884 be extended at the estimated cost of $32,500.

In his report on the preliminary examination of this harbor, dated August 19, 1899, the district officer states that the locality, in his judgment, is worthy of improvement only to the extent of maintaining the dredged area of 36 acres in rear of breakwater, affording a depth of 15½ feet mean low water, projected in 1884, for purposes of refuge. The full anchorage covered by the breakwater measures 175 acres.

The cost of the improvement projected in 1884 was estimated at $45,743.20. The separate appropriations made from time to time since that date for its execution have been small and were distributed over a great number of years, causing a large increase in the original cost of improvement.

* * * * * * *

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

D 22.

PRELIMINARY EXAMINATION OF COTUIT HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 167, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit herewith a copy of report, dated August 19, 1899, by Maj. D. W. Lockwood, Corps of Engineers, of the results of a preliminary examination of Cotuit Harbor, Massachusetts, made to comply with provisions of the river and harbor act approved March 3, 1899.

It is the opinion of Major Lockwood, concurred in by the Division Engineer, Col. G. L. Gillespie, Corps of Engineers, and by me, that the harbor is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., August 19, 1899.

GENERAL: The preliminary examination of Cotuit Harbor, Massachusetts, provided for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor, after a personal examination of the locality, to submit the following report with regard to it:

Cotuit Harbor consists of a series of basins or bays opening into Nantucket Sound through what is known as Cotuit Entrance, which is about 8 miles southwesterly from Hyannis. The water area of these bays is about 1,200 acres in extent, and until within the past year the Cotuit Entrance and the small passage between Sampsons Island and Dead Neck Beach were the only ones open. Recently, however, the State of Massachusetts has undertaken the making of an opening between what is known as South Bay and the sound, to be 175 feet wide and 3 feet deep at mean low water, protected by timber bulkheads or revetments extending out to 4 feet depth of water in the sound. The mean range of the tide in the series of bays and connections is about 2.6 feet.

The coast in this section of Nantucket Sound is sandy, and in front of the main entrance to Cotuit Bay there is a broad, flat, sandy area, through which a crooked channel, of varying width and depth, has been made and held by the action of the tides. This channel is subject to change, but the ruling depth on the outer bar, before the deeper water in the sound is reached, is from 3 to 3½ feet at mean low water. The main or western channel is marked by poles and brush, and at the time of the survey by the harbor and land commissioners of Massachusetts, in 1897, followed closely the trend of the shore to the west of the entrance down to near Popponessett, where it made almost a right angle toward the outer bar. There has been but little change since that time. To the eastward of the main channel, and at some distance from the entrance, is an area covered to a certain extent with bowlders of various sizes, and it has been suggested that if these were removed the tides in and out of Cotuit Bay would take the shorter course over this area and make a shorter and more direct channel out to the outer bar. The removal of these bowlders might, however, be detrimental, because if they now prevent the erosion of the area they occupy, their removal might lead to a general readjustment of the bottom, by which the present channel would become shoaler and the cleared area but little deeper. This area, protected from erosion by the bowlders covering it, acts like a submerged jetty, confining the main tidal flow to the present western channel. Between Sampsons Island and Dead Neck Beach is a narrow passage, but it is about closed at its mouth at low water.

I am informed that probably 450 tons of coal and 200,000 to 300,000 feet B. M. of lumber are brought to Cotuit annually by water, besides 200 barrels each of kerosene oil and flour and about 1,500 bushels of grain. The shellfish industry yields from 18,000 to 20,000 bushels of oysters annually and from 4,000 to 5,000 bushels of clams.

I do not consider the locality worthy of improvement, for the reason that the commercial interests, present and prospective, do not justify the expenditure of any considerable amount of money in improvements of any kind. The removal of the bowlders, which many think would afford relief, would, in my opinion, be a hazardous experiment, while dredging would be expensive and afford but temporary relief, even if the dredged channel were revetted.

Very respectfully, your obedient servant,

D. W. LOCKWOOD.
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 21, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

D 23.

PRELIMINARY EXAMINATION OF VINEYARD HAVEN, MASSACHUSETTS, WITH A VIEW TO ITS FURTHER PROTECTION AND IMPROVEMENT AS A HARBOR OF REFUGE BY A BREAKWATER OR OTHERWISE.

[Printed in House Doc. No. 66, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, November 21, 1899.

SIR: The river and harbor act approved March 3, 1899, provides in section 22 for an examination of Vineyard Haven, Massachusetts, with a view to its further protection and improvement as a harbor of refuge by a breakwater or otherwise, and the duty of making the examination was assigned to Maj. D. W. Lockwood, Corps of Engineers.

In his report of September 13, 1899, Major Lockwood states that he is not prepared to state definitely that the locality is worthy of improvement, but at the same time he is of opinion that there is great need for some safe harbor for vessels passing through Vineyard and Nantucket sounds.

The division engineer, Col. G. L. Gillespie, Corps of Engineers, in his indorsement transmitting to this office the report of the local engineer, remarks that—

> The navigable waters between Vineyard Haven and Nantucket Shoals, 35 miles to the eastward, are obstructed by many submerged shoals which give intricate sailing courses and cause difficult inside navigation during easterly or westerly storms, and it seems probable that no single harbor can be found which will give full protection to all vessels which may be caught in these straits during adverse weather.
>
> My own opinion is that such protection must be sought in two small and well-located harbors of refuge, one on the west, in the region of Vineyard Haven, and the other on the east, in the region of Nantucket, Great Point, or Monomoy Point.

The report of Major Lockwood, with indorsement of the division engineer, was presented to the Secretary of War with my indorsement of September 20, in which I recommended that no survey of the locality be made at this time, but suggested that the report be submitted to Congress with recommendation that the subject of an efficient harbor of refuge for all classes of vessels navigating Vineyard and Nantucket sounds shall receive careful consideration, and that a Board of Engineers shall make a thorough examination and study of the entire locality, select the best site or sites for such harbor or harbors of refuge, and after such selection shall make the necessary surveys, plans, and estimates therefor.

This suggestion being approved by the Secretary of War, I have now the honor to submit the accompanying copies of the papers in the case, with recommendation that they be transmitted to the Speaker of the House of Representatives for such action in the case as Congress in its judgment may deem proper to take.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., September 13, 1899.

SIR: The preliminary examination of Vineyard Haven, Massachusetts, with a view to its further protection and improvement as a harbor of refuge by a breakwater or otherwise, provided for in the river and harbor act of March 3, 1899, having been assigned to me, I have the honor, after a personal examination of the locality, to submit the following report with reference to it:

Vineyard Haven is about 17 miles from the western entrance to Vineyard Sound, and about 30 miles from Cape Monomoy, the southern extremity of Cape Cod. The Coast Pilot describes it as "a wide and deep indentation in the north shore of Marthas Vineyard affording good shelter from southerly or westerly winds, in from 3 to 5 fathoms of water—soft bottom." It is V-shaped in form, about 1½ miles long in a northeast and southwest direction, and 1½ miles wide at its entrance. Its area, bounded by a line joining the East and West Chop lights and the 18-foot curve, is about 540 acres.

Reports on this locality in connection with a harbor of refuge were made in 1882 by Lieut. Col. G. K. Warren, Corps of Engineers (see Annual Report, Chief of Engineers, 1882, p. 592), and by Lieut. Col. George H. Elliot, Corps of Engineers, in 1886 and 1887 (see Annual Report, Chief of Engineers, 1887). In both of the above-mentioned reports the need of protection against northeast storms was strongly set forth. The natural features of the locality afford ample protection except against storms from the northeast.

The commerce that passes the Vineyard has changed materially since the reports mentioned were written, steam being a much more important factor now than then; for general purposes the size of sailing craft has increased very much within the last fifteen years, and these vessels are much better equipped than formerly, making them more capable of standing the severe storms that now and then prevail. With their improved holding gear the larger class of sailing vessels can anchor out in the sound, or running over to the north shore ride out the severe northeasters in safety.

There is a large class of small vessels, however, passing through the sound at all times that are engaged in carrying a cheap class of freight, or that trade principally with small places, poorly equipped as a general thing, with deficient holding gear, that are in danger practically at all times in stormy seasons. Harbors of refuge for these vessels are needed pretty much everywhere.

In heavy storms from any direction some portions of Nantucket and Vineyard sounds are badly exposed, and opinions among vessel men will differ as to the locality where a harbor of refuge is most needed, according to their experience. It often happens that vessels are caught near the eastern end of Nantucket Sound, and if bound east anchor to the west of Monomoy Point (south side of Chatham Roads) if the storm is from the east or northeast. In such cases a change of wind to the southeast would be disastrous; but it is said this change of wind rarely happens, i. e., in a heavy northeaster a shift of wind with the same force to the southeast is rare, although now and then a heavy southeaster changes to the northeast, and the great disasters in Vineyard Haven in years past are due to this fact. No vessel would run into Vineyard Haven in a northeaster.

It is an open question with me whether or not, under the conditions that prevail, a breakwater across the mouth of Vineyard Haven is desirable. Under ordinary circumstances vessels use this anchorage only temporarily, waiting for a change of wind or tide, or both. The currents by the Vineyard are very swift, and vessels run into this convenient anchorage out of the way of steam vessels and tows to await a change of wind or tide, or in foggy weather. Vessels bound to the east run in at night when the weather is bad and wait for daylight before venturing among the shoals. The construction of a breakwater across the mouth would necessarily interfere to a greater or less extent, depending upon conditions of wind and tide, with the free use of this anchorage as indicated above, and it is questionable whether the majority of vessel masters would not object to the constant obstruction of the entrance in all weather.

In Nantucket and Vineyard sounds the storms come up suddenly, and a harbor of refuge should be one that is readily accessible at all times. In the present case the entrances would necessarily be more or less difficult in heavy weather, if the anchorage area is to be thoroughly protected. The Hedge Fence is 2 miles from the East Chop Light, and the effect of a breakwater in front of Vineyard Haven would be to still further reduce the width of this, the main channel, out to the Cross-Rip Light-ship. This passage is none too wide already for vessels beating through. A breakwater to cover the mouth of Vineyard Haven would necessarily be established in from 5 to 10 fathoms of water, and its cost would be great. It would protect the anchorage from the heavy seas in northeast storms, but would not furnish any protection against the wind, so that the smaller craft, which are generally furnished with poor anchor gear, would be blown about in pretty much the same manner as now. Larger vessels now are frequently deterred from anchoring in the haven on account of being fouled by these smaller vessels dragging their anchors.

In conclusion, I would state that, in my opinion, there is great need of some safe harbor for vessels passing through these sounds—a harbor of refuge which can be entered during storms—but that such a harbor, costing as it will a large amount of money, should be located where, under ordinary conditions, it will not itself be an obstruction to free navigation, and where it will benefit the largest number of vessels. As already stated, the tidal currents in this locality are swift, and it is difficult to state in advance what the effect of a breakwater in front of Vineyard Haven would be, and whether, in protecting the anchorage area, the entrances would not necessarily be made so difficult as to prevent the harbor being used constantly as it now is.

In my opinion, in determining this question of constructing a harbor of refuge in this locality, both sounds should be considered and a location fixed upon which will best meet the needs of navigation. I am not prepared to state definitely that in my opinion the locality under consideration is unworthy of improvement, and would respectfully recommend that Congress be asked to authorize a general investigation of the question of a harbor of refuge for Vineyard and Nantucket sounds with a view to determining the best location for such a harbor. The bluffs in Vineyard Haven and at the Chops have been protected by riprap placed along the shore at the low-water line. This system has stopped, in a great measure, the washing away of the banks and nothing more is required at present.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, September 14, 1899.

Respectfully forwarded to the Chief of Engineers, recommended for approval.

The necessity for an efficient harbor of refuge for all classes of vessels navigating Vineyard and Nantucket sounds has long been recognized, and many preliminary examinations have been made with the view to its selection. The river and harbor act, August 5, 1886, contained provision for four such examinations, and the act of March 3, 1899, makes provision for two. In fact, five points on the north shore of Marthas Vineyard and two points, opposite, on the continental shore near Woods Hole have been considered at different times, as well as one point at the entrance to Chatham Roads near Monomoy Point, and two points at the northern and eastern end of Nantucket Island.

The navigable waters between Vineyard Haven and Nantucket Shoals, 35 miles to the eastward, are obstructed by many submerged shoals which give intricate sailing courses and cause difficult inside navigation during easterly or westerly storms, and it seems probable that no single harbor can be found which will give full protection to all vessels which may be caught in these straits during adverse weather.

My own opinion is that such protection must be sought in two small and well-located harbors of refuge—one on the west in the region of Vineyard Haven, and the other on the east in the region of Nantucket, Great Point, or Monomoy Point.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
September 20, 1899.

Respectfully submitted to the Secretary of War.

The act of March 3, 1899 (river and harbor act), provides, among other preliminary examinations and surveys, for—

> Vineyard Haven, Massachusetts: With a view to its further protection and improvement as a harbor of refuge by a breakwater or otherwise.

Neither Major Lockwood, the local engineer, nor Colonel Gillespie, the division engineer, expresses, in the within report, any direct and positive opinion as to the worthiness of this improvement, but both submit general remarks touching the necessity for a harbor or harbors of refuge in the vicinity.

No survey at this time is, therefore, recommended, but it is suggested that this report be submitted to Congress, with recommendation that the subject of an efficient harbor of refuge for all classes of vessels navigating Vineyard and Nantucket sounds shall receive careful consideration, and that a Board of Engineers shall make a thorough examination and study of the entire locality, select the best site or sites for such harbor or harbors of refuge, and after such selection shall make the necessary surveys, plans, and estimates therefor.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Third indorsement.]

WAR DEPARTMENT,
September 23, 1899.

Approved as suggested by the Chief of Engineers.

By order of the Secretary of War:

A. N. THOMPSON,
Acting Chief Clerk.

D 24.

PRELIMINARY EXAMINATION AT COTTAGE CITY, MASSACHUSETTS.

[Printed in House Doc. No. 140, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 5, 1899.

SIR: I have the honor to submit the accompanying copy of report dated August 22, 1899, by Maj. D. W. Lockwood, Corps of Engineers, of the results of a preliminary examination of Cottage City, Mass., made to comply with requirements of the river and harbor act approved March 3, 1899.

It is the opinion of the local officer, concurred in by Col. G. L. Gillespie, Corps of Engineers, the division engineer, and by me, that the locality is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., August 22, 1899.

GENERAL: The preliminary examination of Cottage City, Mass., provided for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor to submit the following report:

The improvement desired by those interested in the matter is the protection of the bluff between Highland Wharf and the end of East Chop, Marthas Vineyard, covering a distance of some 3,500 feet. The work is desired in the interest of landowners rather than for commercial purposes. The following extract from a letter written me on April 7, 1899, explains the situation:

> The encroachment of the sea on that portion of our water front lying between East Chop Light-House and the Highland Wharf, so called, has become so great as to endanger both private property and the highway along the bluff, and is far beyond the ability of a small town like ours to cope with. The sand so removed from the beach passes east and west with the tides, and that portion which is carried into Vineyard Haven Harbor has already caused sand bars and shoals, and is filling in the harbor. We have just secured an appropriation from the State legislature of $20,000 to make a harbor of Lake Anthony, and if the waste from this beach is not checked we fear the sand which moves with the easterly tides will fill in there.
>
> What is desired is the continuation of the Government riprap from East Chop, where it has done such good service, along the beach southerly a distance of about 3,500 feet to the wharf. We believe this would prove a most effectual barrier to further encroachment, and that the bluff saved from any further digging out at its base would be preserved for the future.

I do not consider the locality worthy of improvement by the United States, as the danger of shoaling in Vineyard Haven Harbor from material washed out of the bluffs on the east side of East Chop is very remote. The real object of the improvement sought is the protection of the roadway mentioned in the letter and the private property of individuals along the bluff. So far as I can see, no commercial interests are involved.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 24, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

D 25.

EXAMINATION AND SURVEY OF NEW BEDFORD HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 169, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, November 28, 1899.

SIR: I have the honor to submit the accompanying reports, dated June 24, 1899, and November 17, 1899, respectively, with map,[1] by Maj. D. W. Lockwood, Corps of Engineers, giving the results of preliminary examination and survey of New Bedford Harbor, Massachusetts, to remove the bar between the present channel and the northerly terminus of the proposed channel on the northerly side of the New Bedford and Fairhaven Bridge, and also of removing the bar in the channel of New Bedford Harbor, about 800 feet southerly from Fish Island, made in compliance with requirements of the river and harbor act of March 3, 1899.

Under a project adopted by the river and harbor act of March 3, 1899, a channel is now being dredged 250 feet wide and 18 feet deep at mean low water from the anchorage basin at New Bedford through the new drawbridge between Fish and Popes islands, and it is purposed to close the old draw between Fish Island and New Bedford. To enable vessels using the new draw to reach the wharves above the bridge after the old one is closed will necessitate the dredging of a turning area of deep water at the terminus of the upper channel through the new draw and the deepening to 18 feet of the channel along the wharf front above the old draw, which Major Lockwood estimates will require the removal of 35,000 yards of material, at a cost of $7,000.

The plan presented for removal of bar south of Fish Island provides for the extension of the existing channel with a width of 150 feet and depth of 18 feet from Commercial Wharf to the bridge, at an estimated cost of $4,000.

The total estimated cost of the work proposed is—

Above the bridge	$7,000
Below the bridge	4,000
Total	11,000

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

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[1] Not reprinted. Printed in House Doc. No. 169, Fifty-sixth Congress, first session.

PRELIMINARY EXAMINATION OF NEW BEDFORD HARBOR, MASSACHUSETTS, WITH A VIEW OF REMOVING THE BAR BETWEEN THE PRESENT CHANNEL AND THE NORTHERLY TERMINUS OF THE PROPOSED CHANNEL ON THE NORTHERLY SIDE OF THE NEW BEDFORD AND FAIRHAVEN BRIDGE, AND ALSO OF REMOVING THE BAR IN THE CHANNEL OF NEW BEDFORD HARBOR ABOUT 800 FEET SOUTHERLY FROM FISH ISLAND.

United States Engineer Office,
Newport, R. I., June 24, 1899.

General: The river and harbor act of March 3, 1899, provided for a preliminary examination or survey in "New Bedford Harbor, Massachusetts: To remove the bar between the present channel and the northerly terminus of the proposed channel on the northerly side of the New-Bedford and Fairhaven Bridge, and also of removing the bar in the channel of New Bedford Harbor about 800 feet southerly from Fish Island."

By Department letter of March 15, 1899, the duty of making this examination was assigned to me, and in connection therewith, and after personal examination of the locality, I have the honor to submit the following report:

The old draw in the bridge between New Bedford and Fairhaven was located close to the New Bedford shore, and was used by vessels bound to and from the wharves north of the bridge. The new bridge provides for a new draw between Popes and Fish islands and the ultimate closure of the old one. When this latter draw is closed there will be difficulty in reaching the wharves above the bridge through the new draw on account of shoal water west and south of the north end of the new channel, and it is desirable to obviate this by deepening the shoal area mentioned.

The shoal described as about 800 feet south of Fish Island is in all probability a rock in the channel along the city front, and its removal is desirable.

In my opinion the localities described are worthy of improvement by the Government, and I would respectfully recommend that a detailed survey of them be made with a view to obtaining data upon which to base an estimate of cost of improvement. The cost of making a survey is estimated at $250.

The commerce of this locality is general as well as local. The tonnage for 1897 amounted to 668,165 tons.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, June 26, 1899.

Respectfully forwarded to the Chief of Engineers, recommended for approval.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of New Bedford Harbor, Massachusetts (full text of item quoted within).

The localities indicated are reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

SURVEY OF NEW BEDFORD HARBOR, MASSACHUSETTS, WITH A VIEW OF REMOVING THE BAR BETWEEN THE PRESENT CHANNEL AND THE NORTHERLY TERMINUS OF THE PROPOSED CHANNEL ON THE NORTHERLY SIDE OF THE NEW BEDFORD AND FAIRHAVEN BRIDGE, AND ALSO OF REMOVING THE BAR IN THE CHANNEL OF NEW BEDFORD HARBOR ABOUT 800 FEET SOUTHERLY FROM FISH ISLAND.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., November 17, 1899.

GENERAL: I have the honor to submit the following report and estimate of cost of improvement of New Bedford Harbor, Massachusetts:

The river and harbor act of March 3, 1899, provided for a preliminary examination of "New Bedford Harbor: To remove the bar between the present channel and the northerly terminus of the proposed channel on the northerly side of the New Bedford and Fairhaven Bridge, and also of removing the bar in the channel of New Bedford Harbor about 800 feet southerly from Fish Island."

The report of this examination was submitted by me under date of June 24, 1899, and the locality reported as worthy of improvement, and a detailed survey recommended to obtain data upon which to base an estimate of cost of improvement.

Under date of August 28, 1899, the duty of making this survey was assigned to me and an allotment of $250 made to pay the necessary expenses connected with it.

The field work during September and preparation of map were in charge of Assistant Engineer C. M. Winchell.

A tracing of the map of survey is forwarded this day in a separate package.

The shoal below the Fairhaven Bridge is located in the channel along the city front between Fish Island and Commercial Wharf. The main channel from Buzzards Bay to Commercial Wharf is 18 feet deep at mean low water, and to extend this channel to the bridge with a width of 150 feet and the same depth as below will necessitate the removal of 20,000 cubic yards of material, at a cost of 20 cents per yard.

The work above the Fairhaven Bridge is designed to afford a depth of 18 feet to the wharves above the bridge. In the old bridge the draw opening was located between Fish Island and New Bedford. In the new structure it is proposed to close the old draw and replace it with a new one of much larger dimensions between Fish and Popes islands. To enable vessels using the new draw after the old one is closed it will be necessary to make a suitable turning area of deep water at the terminus of the upper channel through the new draw and deepen to 18 feet a channel along the wharf front north of the old draw. This will require the removal of 35,000 cubic yards of material, at an estimated cost per yard of 20 cents.

The entire cost of the improvement is estimated as follows:

Below the bridge, 20,000 cubic yards, at 20 cents	$4,000
Above the bridge, 35,000 cubic yards, at 20 cents	7,000
Total	11,000

There has been a great deal of opposition on the part of wharf owners above the bridge to the closing of the old draw, and it is believed that if the plan proposed, of deepening the water above the bridge, be carried out, this opposition will be materially affected.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, November 18, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

D 26.

PRELIMINARY EXAMINATION OF WESTPORT POINT HARBOR, MASSACHUSETTS.

[Printed in House Doc. No. 68, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, November 20, 1899.

SIR: I have the honor to submit the accompanying copy of report, dated September 11, 1899, by Maj. D. W. Lockwood, Corps of Engineers, of the results of a preliminary examination of Westport Point

Harbor, Massachusetts, made to comply with provisions of the river and harbor act approved March 3, 1899.

For reasons given in his report the local officer is of opinion that the locality is not worthy of improvement by the General Government, and his opinion is concurred in by Col. G. L. Gillespie, Corps of Engineers, Division Engineer, and by me.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

United States Engineer Office,
Newport, R. I., September 11, 1899.

General: The preliminary examination of Westport Point Harbor, Massachusetts, provided for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor, after a personal examination, to submit the following report concerning it:

A survey of this harbor was made in 1878, under the direction of Maj. G. K. Warren, Corps of Engineers, the report of which, together with a full discussion of the conditions existing at the time, was published in the Annual Report of the Chief of Engineers for 1879, to which attention is respectfully invited.

At the time of the survey there was 8 feet of water on the outer bar at mean low water, and 7½ feet in the channels on each side of the "Lions Tongue" inside. The harbor entrance presents the same conditions that are found in harbors on sandy shores everywhere, where the ebb and flow of the tide maintain a deep channel through the throat or narrowest part of the entrance, with a bar above where the channel widens out, and one outside in the open water. At flood tide the current scours out the narrow entrance, and the sand which it carries is dropped as soon as the channel widens out. At ebb tide the same thing happens in the opposite direction, the sand carried out forming a broad bar, with a depth that varies but little from to time, except on account of storms.

In 1879 Major Warren stated—

> There are a few vessels loaded with coal that now enter the harbor to supply a local demand not connected in any way, it is believed, with manufacturing. The harbor seems, therefore, to be of a capacity suited to the present wants. * * * The wearing at Horse Neck Point could be prevented by small sand-catcher jetties, and these could be gradually prolonged, so as to narrow the space opposite and increase the average depth. Perhaps $1,000 might be reasonably expended in this way.

In my opinion this would result only in moving the inside bar upstream a short distance.

In 1887 a catch-sand jetty was constructed at the end of Horse Neck Point, but it did not appear to affect the depth of water at the "Lions Tongue" Bar.

In 1888 Maj. W. R. Livermore, Corps of Engineers, made a preliminary examination of the locality and reported it worthy of improvement to the extent of $2,000, in extending the jetty already built and dredging. In 1893 the old jetty was rebuilt and extended to a length of 150 feet, and 6,500 cubic yards of sand dredged to the east of Lions Tongue Shoal. This work has been of no benefit.

There are two schooners which trade at this port, carrying coal, etc., and an occasional schooner load of lumber is brought in. The commerce of the locality is purely local, and of such a character and extent that the harbor as it now is is sufficient for its requirements. Small amounts expended in the improvement of this place will produce no beneficial results, and the most that could be done would be to secure the same depth inside that there is on the bar outside, to wit, about 1 foot more than there is now, and this can only be accomplished at a cost much greater than the commerce of the locality will warrant. I have no hesitation in stating that, in my opinion, the locality is unworthy of improvement by the General Government.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, September 12, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

The appropriations made for Westport Harbor in 1886, 1890, and 1892 aggregate $3,000, all of which has been expended.

The work was completed in 1893, since which year the name does not appear in the Annual Reports of the Chief of Engineers.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

D 27.

PRELIMINARY EXAMINATION OF CHANNEL OF ASSONET RIVER, MASSACHUSETTS.

[Printed in House Doc. No. 102, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit herewith a copy of report dated August 10, 1899, by Maj. D. W. Lockwood, Corps of Engineers, of the results of a preliminary examination of Assonet River, Massachusetts, made to comply with provisions of the river and harbor act approved March 3, 1899.

It is the opinion of the local officer, concurred in by Col. G. L.

Gillespie, Corps of Engineers, Division Engineer, and by me, that the locality is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., August 10, 1899.

GENERAL: The preliminary examination of channel of Assonet River, Massachusetts, provided for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor to submit the following report concerning it:

This stream is a branch of the Taunton River and empties into it a short distance above the Somerset railroad bridge. The village of Assonet, or Freetown, containing between 600 and 700 inhabitants, is about 3 miles from the mouth of the river, and it is below this place that it is desired to improve the river by deepening and straightening the channel. There is ample depth at low water from the Taunton River to and through Assonet Bay, an interior tidal basin formed by the widening of the stream, but from the upper end of the bay to Assonet village the channel is quite crooked, and carries but about 8 feet depth at ordinary high water. The rise and fall of the tide is about the same as in the Taunton River, or about 3.7 feet.

As near as I could determine, the present commerce of the locality is as follows: Between 600 and 700 tons of coal are annually brought to Assonet by water, and the shipments from the place by water consist of about 1,000,000 feet B. M. of box boards and cord wood, carried by boats drawing about 8 feet. It is claimed that 1,000,000 feet B. M. of box boards are now shipped by rail to Fairhaven that would go direct by water from Assonet if vessels drawing 10 feet could reach the wharf at that place at high water. The only manufactories at Assonet are a sawmill for sawing box boards and a factory for making shotguns. This latter uses only about 125 tons of coal per annum, and there would appear to be no prospect of any increase in manufactories, etc., if greater water facilities were secured.

Taking into account the present needs and future prospects of the place, I do not consider the locality worthy of improvement by the Government.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[Third indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 17, 1899.

Respectfully returned to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

D 28.

EXAMINATION AND SURVEY OF PAWTUCKET RIVER, RHODE ISLAND.

[Printed in House Doc. No. 113, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 4, 1899.

SIR: I have the honor to submit the accompanying copies of reports by Maj. D. W. Lockwood, Corps of Engineers, dated August 29, 1899, and November 25, 1899, with map,[1] respectively, of the results of a preliminary examination and a survey of Pawtucket River, Rhode Island, made to comply with the provisions of the river and harbor act of March 3, 1899.

This stream is now being improved by the General Government under a project adopted by the act of March 3, 1899, which provides for straightening the channel between Ten-mile River and Bucklins Island, and upon the completion of this work there will be a 12-foot mean low-water channel 100 feet wide from Providence Harbor to near the wharves at Pawtucket, thence 40 feet wide through the rocky ledge to near Pawtucket Bridge.

It appears from the report on survey that passage through the railroad bridge at India Point by much larger vessels than the present channel will accommodate may be impracticable, and Major Lockwood is doubtful whether it is advisable to widen and deepen the channel above Red Bridge in advance of a change in the railroad bridge, but the local interests desire a greater depth, and he presents a plan for obtaining a channel 16 feet deep and 100 feet wide at bottom from Red Bridge up to the rock cutting, and a channel through this 50 feet wide by 16 feet deep, which he estimates will cost, including contingencies, $237,875.

Major Lockwood states, however, for reasons given, that he does not feel justified in recommending an increase in the depth of the channel of Pawtucket River while the condition of affairs remains as at present at the railroad bridge at India Point, although $10,000 could be expended advantageously in cleaning out the present channel to its full width of 100 feet for 12 feet depth.

In forwarding the report on survey to this office, Col. G. L. Gillespie, Corps of Engineers, the Division Engineer, states that the railroad bridge at India Point is an unreasonable obstruction to navigation, and he recommends that no further appropriation be made for the improvement of the river from this bridge to the town of Pawtucket until the bridge shall have been reconstructed to meet the demands of the commerce of the upper reach of the river.

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[1] Not reprinted. Printed in House Doc. No. 113, Fifty-sixth Congress, first session.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF PAWTUCKET RIVER, RHODE ISLAND.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., August 29, 1899.

GENERAL: The preliminary examination of Pawtucket River, Rhode Island, called for in river and harbor act of March 3, 1899, having been assigned to me, I have the honor to submit the following report concerning it:

The navigable part of the Pawtucket, or Seekonk, River, an arm of the Providence River, extends from Providence to Pawtucket. Originally the channel was narrow and winding, with an available depth of 5 feet at mean low water. The work of improving this channel was commenced in 1867 and up to 1876 $52,000 had been expended, resulting in a dredged channel 75 feet wide and 7 feet deep at mean low water.

In 1883 a project was approved for increasing the width and depth to 100 feet and 12 feet, respectively, and blasting a channel 40 feet wide and 12 feet deep through the rock ledge at the upper end of the work to the bridge. The estimated cost of this project was $382,500.

At the present time this project has been practically completed at a cost of $214,372; that is, a channel 100 feet wide and 12 feet deep at mean low water has been dredged up to the rock ledge, and a cut through it 40 feet wide and 12 feet deep blasted out. The great saving in cost was in connection with the rock work.

The river and harbor act of March 3, 1899, provided for straightening the channel between Ten-mile River and Bucklins Island, estimated to cost $70,000, the straightened part to be the same width and depth as the main channel.

The main dredged channel has deteriorated somewhat in width and depth so that at low water full 12 feet can hardly be carried at present, and since the original project was approved the city of Pawtucket and its commerce have largely increased. The commercial interests involved would appear to justify an increased width and depth of channel, but the obtaining of these is dependent upon the completion of the new work between Ten-mile River and Bucklins Island.

In my opinion the locality is worthy of improvement, and I would respectfully recommend that a survey be authorized covering that part of the river from the Red Bridge to Ten-mile River and from Bucklins Island to the Pawtucket Bridge. The estimated cost of this survey is $400.

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, August 30, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer, and recommending that a survey be made from Red Bridge to Ten-mile River and from Bucklins Island to the Pawtucket Bridge, at the estimated cost of $400.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
September 5, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Pawtucket River, Rhode Island.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

WAR DEPARTMENT,
September 7, 1899.

Approved as recommended by the Chief of Engineers.

By order of the Secretary of War:

A. N. THOMPSON,
Acting Chief Clerk.

SURVEY OF PAWTUCKET RIVER, RHODE ISLAND.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., November 25, 1899.

GENERAL: The river and harbor act of March 3, 1899, provided for a preliminary examination of Pawtucket River, Rhode Island. The duty of making this examination was assigned to me, and under date of August 29, 1899, I had the honor to submit a report of same, recommending that a detailed survey be made covering the reach from the Red Bridge to Ten-mile River and that between Bucklins Island and the Pawtucket Bridge. The portion of the river between Bucklins Island and Ten-mile River had already been surveyed in connection with straightening the old channel between those points, for which provision was made in the last river and harbor act.

Before the improvement of this stream by the United States was commenced the depth was about 5 feet at mean low water, the channel being narrow and crooked. Between 1867 and 1876 a channel 75 feet wide and 7 feet deep at mean low water was dredged, and nothing more was done until the adoption of the project of 1883, which provided for widening the channel to 100 feet and increasing its depth to 12 feet at mean low water. The amount of money expended down to 1876, which resulted in a channel 75 feet wide and 7 feet deep at mean low water, was $52,000.

The estimated cost of the project of 1883 was $382,500, although the work was actually completed in 1897 for $214,372, the saving having been due principally to decreased cost of submarine rock work.

The old channel of 7 feet depth was along the line, practically, of deepest water, and when the width and depth were increased by the project of 1883 the same line was followed. In the last river and harbor act provision was made for straightening the channel between Ten-mile River and Bucklins Island, and this work is now in progress. When this work is completed there will be a channel 100 feet wide and 12 feet deep at mean low water from Providence Harbor to near the wharves at Pawtucket, and from thence up a channel 40 feet wide and 12 feet deep through the rocky ledge to near Pawtucket Bridge.

When the improvement of this river was first commenced there were three bridges crossing it which constituted serious obstructions to navigation: (1) The railroad bridge at India Point; (2) the Washington Bridge 250 feet north of it; and (3) the Red Bridge about four-fifths of a mile north of the Washington Bridge. The draw in the old Washington Bridge was so bad that for a number of years General Warren declined to make estimates for improving Pawtucket River. Later the State of Rhode Island provided for rebuilding this bridge, and it and the Red Bridge now have double draws 80 feet wide, so that they are no longer to be classed as obstructions to navigation. The railroad bridge, however, remains as it was constructed in 1867–68. The act of the State legislature authorizing its construction provided for two draw openings 60 feet wide in the clear, but the eastern opening has been closed entirely by guide piling for the western opening and the width of the western opening reduced to 47 feet by fender piles.

This bridge is located so that there is a sharp turn in the channel just below it, making the passage of the draws extremely difficult, as the tidal current is sometimes quite 5 miles an hour.

It is an open question, in my opinion, whether it is worth while to widen and deepen the channel above the Red Bridge in advance of a change in the railroad bridge at India Point, as it may be found impracticable to take much larger vessels through the draw at all times than the present channel above Red Bridge will accommodate. In 1883 Lieut. Col. George H. Elliot, Corps of Engineers, stated in reference to this matter:

> The railroad bridge does not seriously obstruct the tidal flow on which the maintenance of the channel of the Pawtucket depends, but the draw of this bridge is also badly located and is too narrow. The draw openings are 60 feet wide, and fender piles reduce the available width to about 47 feet. It is probable that when Washington Bridge is rebuilt the navigation interests and the town of Pawtucket will demand and effect an amelioration of the draw of the railroad bridge.

Although Washington Bridge and the Red Bridge have been changed to meet the increasing demands of navigation, no material change has been made in the railroad bridge, through which but one boat or barge can be taken at a time.

It would seem probable that with increasing railroad traffic some change would be required in the railroad bridge before long, and when this is made the reconstructed structure should be made to be as little of an obstruction to navigation as it is possible to make it.

Coal dealers in Pawtucket are anxious to secure such a channel that coal can be delivered at their wharves in deep-draft barges, and this would require a depth of 16 feet at mean low water. As nearly all the freight must be towed, there would appear to be no need of a very wide channel, although there is less deterioration of banks from the wash of propeller wheels in a wide channel than in a narrow one.

To obtain a channel 16 feet deep and 100 feet wide at bottom from Red Bridge up to the rock cutting, and a channel through this 50 feet wide by 16 feet deep, will cost as follows:

545,000 cubic yards mud and sand, at 25 cents	$136,250
8,000 cubic yards rock, at $10	80,000
	216,250
Contingencies, 10 per cent	21,625
Total	237,875

The commerce of Pawtucket since 1894 in tons has been as follows:

	Tons.
1894	183,450
1895	195,474
1896	201,500
1897	200,000
1898	204,000

Of the above, over 88 per cent consisted of coal and minerals.

The distance from the railroad bridge at India Point to the Red Bridge is 0.86 mile.

The distance from the Red Bridge to Pawtucket Bridge is 3.4 miles. The rise and fall of the tide is 5 feet.

It appears from the survey that there is at present 12 feet at mean low water up to Pawtucket Bridge, and as the distance from Red Bridge to this point is only 3.4 miles and the rise and fall of the tide 5 feet, vessels drawing considerably more than 12 feet can now reach the wharves at Pawtucket.

With the reach between Bucklins Island and Ten-mile River straightened, navigation will be materially improved. While deeper water would doubtless lessen freight charges somewhat, the real trouble, in my opinion, is at the railroad bridge. Under the circumstances I do not feel justified in recommending an increase in the depth of the channel of Pawtucket River while the condition of affairs remains as at present at this bridge, although $10,000 could be expended advantageously in cleaning out the present channel to its full width of 100 feet for 12 feet depth.

A tracing of map of survey is forwarded this day in a separate package.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, November 29, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer relative to the railroad bridge at India Point. This bridge, which was built in 1867–68, is not only badly located as regards the navigation of the river, but its draw openings have such deficient widths that the structure is an unreasonable obstruction to navigation.

It is recommended that no further appropriation be made for the improvement of the river from the railroad bridge to the town of Pawtucket until the bridge is reconstructed to meet the demands of the commerce of the upper reach of the river.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

D 29.

EXAMINATION AND SURVEY OF PROVIDENCE HARBOR AND RIVER, RHODE ISLAND.

[Printed in House Doc. No. 108, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 27, 1899.

Sir: The river and harbor act of March 3, 1899, provided for preliminary examination and survey of Providence Harbor and River, Rhode Island, as to the advisability of dredging that portion of the flats therein between Wilkesbarre Pier, Kettle Point, and the present ship channel to a depth of 25 feet at mean low water, to provide increased anchorage grounds, and a project for such improvement, with the probable cost thereof.

The duty of making the examination and survey thus provided for was assigned to Maj. D. W. Lockwood, Corps of Engineers, and I have the honor to submit the accompanying copy of that officer's report of examination, dated June 13, 1899, and of report dated November 11, 1899, with maps, on survey of the locality.

A plan for deepening, by dredging to a depth of 25 feet, the area between the main ship channel and the harbor line from Wilkesbarre Pier to Kettle Point (about 124 acres) is presented by Major Lockwood, who estimates the cost of the work, including contingencies, at $724,856; but he recommends, for reasons stated, that the improvement be not extended lower down than Long Bed, which would reduce the area to 75 acres.

An alternative project is also presented which provides for dredging to a depth of 25 feet mean low water the area between Wilkesbarre Pier and Long Bed, and includes Green Jacket Shoal and the area between the channel and the harbor line on the west side of the river, in all about 171 acres, shown by full red line on the accompanying Coast Survey map, at an estimated cost of $607,777.50.

In the opinion of Major Lockwood the latter plan is the better one, as it will provide an anchorage with nearly 50 acres more than the former and will cost $117,078.50 less.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF PROVIDENCE HARBOR AND RIVER, RHODE ISLAND, AS TO THE ADVISABILITY OF DREDGING THAT PORTION OF THE FLATS THEREIN BETWEEN WILKESBARRE PIER, KETTLE POINT, AND THE PRESENT SHIP CHANNEL TO A DEPTH OF 25 FEET AT MEAN LOW WATER, TO PROVIDE INCREASED ANCHORAGE GROUNDS, AND A PROJECT FOR SUCH IMPROVEMENT, WITH THE PROBABLE COST THEREOF.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., June 13, 1899.

GENERAL: The river and harbor act of March 3, 1899, provided for a preliminary examination or survey of Providence Harbor and River, Rhode Island:

> As to the advisability of dredging that portion of the flats therein between Wilkesbarre Pier, Kettle Point, and the present ship channel to a depth of twenty-five feet at mean low water, to provide increased anchorage grounds, and a project for such improvement, with the probable cost thereof.

By Department letter of March 15, 1899, the duty of making this examination was assigned to me, and in connection therewith and after personal examination of the locality I have the honor to submit the following report:

While there exists at present a channel 25 feet deep and about 400 feet wide up Providence River, there is no suitable anchorage area outside of the channel for deep-draft vessels waiting to unload or which, having loaded at the wharfs, are awaiting a suitable opportunity to go to sea, the result being that frequently vessels are compelled to anchor in the channel or, anchoring outside of it at high water, are grounded at low water.

The main channel is more or less obstructed at all times.

The harbor line established by the State runs from the end of Wilkesbarre Pier to Kettle Point, and between that and the channel is a large flat, the removal of which would afford great relief to commerce. The distance from Fox Point to the head of Wilkesbarre Pier is about three-eighths of a mile, while the distance from Wilkesbarre Pier to Kettle Point is 1¼ miles.

In my opinion the locality is worthy of improvement by the General Government, and I would respectfully recommend that a detailed survey of the locality be made with a view to obtaining data for a report and estimate of cost of the improvement.

The commerce of this locality is general in its nature as well as local. In the calendar year ending December 31, 1897, the tonnage of the port amounted to 2,152,975 tons, and this tonnage is increasing as deeper draft vessels are used.

The survey should include numerous borings to determine character of material to be removed. Some of it is known to be very hard, particularly that below Sassafras Point.

The estimated cost of survey is as follows:

Field work, 15 days, at $30 per day	$450
Office work, preparation of maps, etc., 15 days, at $10 per day	150
Total	600

Very respectfully, your obedient servant,

D. W. LOCKWOOD,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, June 14, 1899.

Respectfully forwarded to the Chief of Engineers, recommended for approval.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Providence Harbor and River, Rhode Island (full text of item quoted within).

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

SURVEY OF PROVIDENCE HARBOR AND RIVER, RHODE ISLAND, AS TO THE ADVISABILITY OF DREDGING THAT PORTION OF THE FLATS THEREIN BETWEEN WILKESBARRE PIER, KETTLE POINT, AND THE PRESENT SHIP CHANNEL TO A DEPTH OF 25 FEET AT MEAN LOW WATER, TO PROVIDE INCREASED ANCHORAGE GROUNDS, AND A PROJECT FOR SUCH IMPROVEMENT, WITH THE PROBABLE COST THEREOF.

UNITED STATES ENGINEER OFFICE,
Newport, R. I., November 11, 1899.

GENERAL: The river and harbor act of March 3, 1899, provided for a preliminary examination of Providence Harbor and River:

> As to the advisability of dredging that portion of the flats therein between Wilkesbarre Pier, Kettle Point, and the present ship channel to a depth of 25 feet at mean low water, to provide increased anchorage grounds, and a project for such improvement, with the probable cost thereof.

The report of this examination was submitted under date of June 13, 1899, and the locality reported as worthy of improvement, and a detailed survey recommended to obtain data for a report and estimate of cost of improvement.

Under date of August 28, 1899, the duty of making this survey was assigned to me and an allotment made to cover the necessary expenses.

The field work and plotting were in charge of Assistant Engineer C. M. Winchell. During September the triangulation was completed and the necessary soundings taken. A tracing of the map of survey, the scale being 1 inch to 200 feet, is forwarded this day in a separate package.

Owing to the increase in the commerce of Providence in late years, and to the fact that deeper draft vessels are employed now than formerly, the need of additional harbor space has become very marked. Loaded vessels arriving are frequently compelled to anchor in the dredged channel, if unable to reach their docks at once, and in this way very seriously obstruct navigation. At present there is not sufficient harbor room to accomodate the vessels engaged in the commerce of the place, and yet the channel leading to it has a depth of 25 feet at mean low water.

The deepening of the area included between the channel and the State harbor line between Wilkesbarre Pier and Kettle Point to a depth of 25 feet at mean low water would give an anchorage area of about 124 acres, but the cost of dredging this area would be very great on account of removing Long Bed, which is about opposite Sassafras Point. This shoal is composed of material too hard to dredge to advantage and not quite hard enough to blast. It would seem advisable, also, to secure the necessary anchorage area nearer the city wharfs than Long Bed, and for this reason, and on account of the great cost, I would recommend that the dredged area on the eastern side of the ship channel be not extended lower down than Long Bed. This would add 75 acres to the harbor area for deep-draft vessels. On a Coast Survey chart, forwarded with the map of the recent survey, I have indicated by full red lines an area which if dredged will give an anchorage area of 171 acres.

The deepening of Green Jacket Shoal, the project for which was adopted in 1885, has never been completed. The amounts appropriated have been small, and the work has consequently dragged along from year to year.

The channel provided for in river and harbor act of 1896 extends from Conimicut Point to Sassafras Point; it is 400 feet wide and has a depth of 25 feet at mean low water. The dredging of the anchorage area as indicated on Coast Survey chart will give 25 feet depth at mean low water up to the wharves of Providence and furnish ample harbor accommodations for the commerce of the port for years to come.

To deepen the area between the main ship channel and the harbor line between Wilkesbarre Pier and Kettle Point to a depth of 25 feet mean low water will require the removal of 4,376,000 cubic yards of material, at the following estimated cost:

3,822,600 cubic yards, at 10 cents	$382,260
553,400 cubic yards, at 50 cents[1]	276,700
Total	658,960
Contingencies, 10 per cent	65,896
Total	724,856

Limiting the above area between Wilkesbarre Pier and Long Bed, and including the area between the channel and the harbor line on the west side of the river, and also including Green Jacket Shoal, the amount of material to be removed to secure 25 feet depth at mean low water will be as follows:

---

[1] Long Bed.

	Cubic yards.
Between Wilkesbarre Pier and Long Bed	2,725,250
West of east channel line to harbor line on west side up to Hill's wharf, including redredging of old channel	2,500,000
Green Jacket Shoal	300,000
Total	5,525,250

5,525,250 cubic yards, at 10 cents	$552,525.00
Contingencies, 10 per cent	55,252.50
Total	607,777.50

The last plan, which, in my opinion, is much the better one, will give an increased anchorage area of 171 acres, or nearly 50 acres more than the first, and at the same time cost $117,078.50 less than it.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

D 30.

ESTABLISHMENT OF HARBOR LINES IN MOUNT HOPE BAY, AT FALL RIVER, MASSACHUSETTS.

City of Fall River,
Mayor's Office, March 26, 1898.

Sir: As I am informed by Major Lockwood, Corps of Engineers, U. S. A., now stationed at Newport, R. I., you are the proper authority to whom I should write relative to defining the lines of the harbor of our city.

The citizens interested in shipping, and that includes a great number, are very desirous that this matter should be settled, and it was through their interest and efforts that an order, a certified copy of which is inclosed, was introduced and adopted by the board of aldermen.

Awaiting a favorable reply, I remain,

Most respectfully, yours,

A. M. Jackson, *Mayor.*

Hon. Russell A. Alger,
Secretary of War.

[Second indorsement.]

Office Chief of Engineers,
U. S. Army,
March 31, 1898.

Respectfully referred to Maj. D. W. Lockwood, Corps of Engineers, for report.

To be returned.

By command of Brigadier-General Wilson.

A. Mackenzie,
Lieut. Col., Corps of Engineers.

[Third indorsement.]

U. S. ENGINEER OFFICE,
Newport, R. I., April 8, 1898.

Respectfully returned to the Chief of Engineers, United States Army.

The water front of Fall River from the State line up to the railroad bridge on the Providence branch of the New York, New Haven and Hartford Railroad has been surveyed, and a harbor line between those limits can readily be defined. I am in receipt of a letter from the mayor of Fall River stating that such a line will be perfectly satisfactory, and would therefore recommend that a harbor line from the State line to the Providence Railroad Bridge be defined, after a public hearing to be held in Fall River. The cost of the work, including marking, would be about $100, and I have funds available from appropriation for examinations, surveys, and contingencies of rivers and harbors, allotment of September 5, 1896.

D. W. LOCKWOOD,
Major, Corps of Engineers.

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY.
April 11, 1898.

Respectfully returned to Major Lockwood, who is requested to submit to this office a map showing the line recommended for adoption at this locality. A public hearing will be held in connection with this question and an opportunity afforded all interested parties to present their views as to the proper location of the proposed line, in order that as far as possible the different local interests may be protected and, as far as consistent, the line selected may conform to the wishes of the riparian owners.

The sum of $100 is hereby allotted from the appropriation for examinations, surveys, and contingencies of rivers and harbors to pay the expenses incident to the necessary investigation and inquiries connected with this question.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Fifth indorsement.]

U. S. ENGINEER OFFICE,
Newport, R. I., December 21, 1899.

Respectfully returned to the Chief of Engineers, United States Army, and attention invited to accompanying report and recommendation.

D. W. LOCKWOOD,
Major, Corps of Engineers.

[Sixth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
December 26, 1899.

Respectfully returned to the Secretary of War.

The authorities of the city of Fall River, Mass., having requested the establishment of harbor lines in that harbor, the subject has been given careful consideration by the district engineer officer, Major Lockwood.

Public hearings have been held and all interested parties afforded an opportunity to present their views.

Major Lockwood submits a map[1] on which is shown a red line extending along the eastern shore by the harbor, from the Slades Ferry Bridge to the State line between Massachusetts and Rhode Island.

This line is stated to have been agreed upon after a full discussion of the situation, and Major Lockwood recommends its adoption.

I concur in this recommendation, and have prepared the map for the signature of the Secretary of War.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Eighth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
January 15, 1900.

Respectfully returned to Major Lockwood, with harbor line approved by the Secretary of War.

Major Lockwood will please advise the interested parties of the action of the Department, and when the map has been completed in accordance with his suggestion in report of the 21st ultimo, return all papers to this office for file.

By command of Brigadier-General Wilson:

A. MACKENZIE,
Lieut. Col., Corps of Engineers.

[Ninth indorsement.]

U. S. ENGINEER OFFICE,
Newport, R. I., July 19, 1900.

Respectfully returned to the Chief of Engineers, United States Army, with a description of harbor line as drawn and table of references and angles fixing the positions of turning points. The map of water front of Fall River with harbor line as approved by the Secretary of War, with reference stones located thereon and angles fixing positions of same, is forwarded in a separate package.

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[1] Not printed.

D. W. Lockwood,
Major, Corps of Engineers.

[Note.—The lines referred to above and shown on the map accompanying were approved by the Secretary of War January 12, 1900, the approval being indicated on the map.]

REPORT OF MAJ. D. W. LOCKWOOD, CORPS OF ENGINEERS.

United States Engineer Office,
Newport, R. I., December 21, 1899.

Sir: In compliance with fourth indorsement, Office Chief of Engineers, United States Army, April 11, 1898, I have the honor to submit the following with reference to a proposed harbor line for the harbor of Fall River, Mass., extending from the Providence Railroad Bridge, north of Fall River, south to the State line or boundary line between the States of Massachusetts and Rhode Island. The matter originated in a request, dated city of Fall River, mayor's office, March 26, 1898, from the Hon. A. M. Jackson, mayor of Fall River, to the honorable Secretary of War for the establishment of a harbor line.

Notices of a public hearing to be held at 10 a. m., November 29, 1899, in the common council chamber, city hall, Fall River, Mass., were published in the following Fall River papers, to wit, the Globe and the Evening News, and, in addition, each wharf owner, so far as known, was notified directly in writing of the date of the hearing, its object, and invited to be present.

The first public hearing was held at the time and place mentioned above and was largely attended by wharf owners and others interested in the subject, including the mayor and a member of the board of harbor and land commissioners of the State of Massachusetts. After a general discussion of the object and purpose of a harbor line in this locality and an examination of the map of the water front an adjournment was requested in order that a further study of the subject might be made by interested parties. A map of the water front was left at the board of trade for general examination. The hearing was adjourned to 10 a. m., December 20, 1899, to be held in the council chamber, city hall.

At the adjourned hearing the line shown in red on the tracing forwarded this date in a separate package was agreed upon after a full discussion of the situation. A suggestion was made by a representative of the Providence, Fall River, and Newport Steamboat Company, whose dock is in the reentrant north of the Fall River Line dock, that the line should follow the heads of docks in this reëntrant, with a view to protecting their property against injury from adjacent docks being further extended. This was not deemed advisable, as property rights inside of a harbor line are matters that can be left to the State courts for adjustment and settlement.

A map of the harbor of Fall River, Mass., scale 1 inch to 200 feet, is forwarded this day in a separate package, on which is shown a red line extending from the east abutment of the Providence Railroad

Bridge to the State line, and which I would respectfully recommend as a harbor line along the eastern shore of the harbor. In case this line meets the approval of the Secretary of War, I would respectfully request that the map may be returned to me in order that the line may be marked by suitable reference points on the land, and a description of its location with reference to these points be prepared and submitted for approval.

The papers in relation to the matter are herewith returned.

Very respectfully, your obedient servant,

D. W. Lockwood,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

DESCRIPTION OF FALL RIVER HARBOR LINE AS APPROVED BY THE SECRETARY OF WAR, JANUARY 12, 1900.

Beginning at a point near the southwest corner of the east abutment of the Slades Ferry Bridge, which point is designated as point No. 1 in the appended table and is located by the angles and distances given therein; thence in a southwesterly direction to the northwest corner of the Mechanics Mill wharf, which corner is situated on the prolongation of the line joining two granite bounds marked U. S. Harbor Line set on the line of the northerly side of the wharf prolonged and designated as bounds Nos. 2 and 3 in the appended table, and distant from bound No. 2, 373.5 feet, and from bound No. 3, 463.5 feet; thence to a point in Taunton River 50 feet to the westward of the southwest corner of David M. Anthony's wharf, which point is situated 574 feet, measured on the prolongation of the southerly side of the wharf, from a granite bound marked U. S. Harbor Line set on a bluff 17.5 feet to the southward of the south side of Hathaway street, and is designated in the appended table as bound No. 4; thence to a point in Taunton River, 30 feet to the westward of the southwest corner of the wharf of the Staples Coal Company, which point is situated in the prolongation of a line joining two granite bounds marked U. S. Harbor Line set in the Staples Coal Company's yard on the line of the southerly side of the wharf prolonged and designated as bounds Nos. 5 and 6 on the appended table, and is distant from bound No. 5, 446 feet, and from bound No. 6, 653.5 feet; thence to a point in Taunton River 30 feet to the westward of the southwest corner of the Old Colony Steamboat Company's wharf, which point is 542.25 feet measured along the southerly side of the wharf and its prolongations, from a point cut on the granite curb inclosing the asphalt walk surrounding the brick ticket office and waiting rooms near the shore end of the wharf marked U. S. Harbor Line and designated as point No. 7 in the appended table; thence to point in Mount Hope Bay, 75 feet to the westward of the northwest corner of the Staples Coal Company's wharf, Globe wharf, so called, which point is situated in the prolongation of the northerly side of the wharf and of a line joining two granite bounds set in the Staples Coal Company's yard, marked U. S. Harbor Line and designated in the appended table as bounds Nos. 8 and 9, and is distant from bound No. 8, 344 feet, and from bound No. 9, 551.3 feet; thence to a point in Mount Hope Bay in the prolongation of a line joining two granite bounds marked U. S. Harbor Line and designated as bounds Nos. 10 and 11 in the appended table, which point is distant 615 feet from bound No. 10 and 1,039.7 feet from bound No. 11; thence to a point in Mount Hope Bay in about 18 feet of water at mean low tide, which point is on a line making an angle of 12° 13′ to the northward of the prolongation of a line joining two granite bounds marked U. S. Harbor Line and designated as bounds Nos. 12 and 13 in the appended table and is 460 feet from bound No. 12; thence following approximately the 18-foot contour in Mount Hope Bay to a point on the boundary line between the States of Massachusetts and Rhode Island distant 850 feet from a stone monument on the eastern shore of Mount Hope Bay marked "Mass. R. I. 1898," being bound No. 103 standing in the center of State avenue at its intersection with high-water mark on the east shore of Mount Hope Bay, as described in an act establishing the boundary line between the State of Rhode Island and Commonwealth of Massachusetts, being chapter 683 passed by the general assembly of the State of Rhode Island, May 26, 1899.

Table of angular readings taken to prominent objects from the granite bounds marking the position of the Fall River harbor line.

Objects.	Granite bounds and points.											
	Point No. 1.		Bound No. 2.		Bound No. 3.		Bound No. 4.		Bound No. 5.		Bound No. 6.	
	°	′	°	′	°	′	°	′	°	′	°	′
Line of Slades Ferry Bridge parallel to axis of bridge	0	00										
City Hall, center of dome	227	52	252	36	253	22						
Light-houses:												
Mussel Bed Shoal	275	00										
Bordens Flats					299	06			332	28		
U. S. C. S. Station, Mount Hope	285	43			311	06						
Northeast corner Old Ferry dock, west side Taunton River	287	13					330	40	354	15	354	28
Center of south face of lattice post supporting west end of shore span of Slades Ferry Bridge	[a]143	13	67	51	58	52	83	45				
South line of wharf							0	00	0	00	0	00
North line of wharf			0	00	0	00						
Tower near Bristol, R. I							329	33				
Iron derrick on derrick wharf									317	51	321	04
Northwest corner of cement shed									[b]304	22		
Mill chimneys:												
Fall River Iron Works Co	253	20	279	46	280	30	288	22			306	50
Mechanics' Mill	208	44			225	27	101	18			91	00
Sanford spinning							296	10				
Sanford spinning							296	25				
Wetamoe					109	06	97	53				
Mettacomet											281	53
American Linen Co											308	41
Chimneys:												
King Philip Brewery											290	27

Objects.	Granite bounds and points.													
	Point No. 7.		Bound No. 8.		Bound No. 9.		Bound No. 10.		Bound No. 11.		Bound No. 12.		Bound No. 13.	
	°	′	°	′	°	′	°	′	°	′	°	′	°	′
Light-houses:														
Mussel Bed Shoal							268	55			292	30	293	05
Bristol Ferry							272	59			297	06	297	43
Bordens Flats			68	57					62	23	96	55	95	34
Spar Island							301	32	303	22	354	27	354	39
U. S. C. S. Station, Mount Hope							288	48	290	05	323	07	323	51
South line of wharf	0	00					0	00	0	00				
North line of wharf			0	00	0	00								
Tower near Bristol, R. I							305	02	305	59	310	58	341	26
Iron derrick on derrick wharf	328	06												
Center of south truss of draw span of Slades Ferry Bridge			74	59										
Center pier of railroad bridge over Coles River											62	41		
Southeast corner stone freight building on wharf	[c]96	58												
Northwest corner stable					[d]259	33								
Southwest corner Chemical Works Wharf											266	27	272	04
Globe (Staples) wharf											97	46	95	34
Mill chimneys:														
Fall River Iron Works Co			103	52	100	58	96	58	91	49	108	21		
Mechanics' Mill			83	17			94	24						
Sanford spinning			220	27			186	13	193	55				
Sanford spinning			223	29			196	14	210	39	108	24	107	03
Mettacomet	160	22												
Chimney in Warren											12	13	12	17
Chimney in Warren							339	52	340	10	14	17	14	18
American Linen Co					107	19								
Fall River Manufacturing Co	155	44												
Pocassett	153	07												
Chimneys:														
King Philip Brewery							256	38			111	09	103	45
Staples Coal Co			266	33	296	26	57	44	28	51	100	33		
Billings, Clapp & Co., Chemical Works											255	36	261	31
American Fisheries Co., near Tiverton Bridge											269	39	270	40

[a] Distant 7 feet.
[b] Distant 32.4 feet.
[c] Distant 52.2 feet.
[d] Distant 9.15 feet.

REMARKS RELATIVE TO THE LOCATION, ETC., OF THE GRANITE BOUNDS MARKING THE HARBOR LINE.

Point No. 1 is unmarked, except by angles and the distance to the center of the south face of the south iron lattice post supporting the west end of the east-shore span or girder span of the Slades Ferry Bridge.

Bounds Nos. 2 and 3 are set on the prolongation of the north side of Mechanics' Mill wharf, No. 3 being near the curb line on the east side of Remington avenue, and No. 2 being on the shore to the west of Remington avenue and distant 90 feet from No. 3. The line joining these two bounds, prolonged to the eastward, strikes the northwest corner of the brickwork of the main building of the Mechanics' Mill. The zero line for the angular readings taken at these bounds is the line joining them and its prolongation, the northerly side of the wharf.

Bound No. 4 is set on a bluff on the easterly side of the river 17.5 feet to the southward of the southerly side of Hathaway street, and is also in the prolongation of the southerly side of D. M. Anthony's wharf. The zero line for the readings taken at this point is the line extending from the granite bound to the southerly side of the wharf.

Bounds Nos. 5 and 6 are set in the Staples Coal Company's yard on the prolongation of the southerly side of the wharf, No. 5 being about 20 feet back from the shore end of the wharf, and No. 6 being about 5 feet inside of the fence on the westerly side of Davol street. The distance between the granite bounds is 207.5 feet. The zero line for the angular readings taken at these two bounds is the line joining them and its prolongation, the southerly side of the wharf.

Point No. 7 is cut on the granite curb inclosing the asphalt walk surrounding the brick ticket office and waiting room near the shore end of the Old Colony Steamboat Company's wharf. The zero line for the angular reading from this point is the line of the southerly side of the wharf.

Bounds Nos. 8 and 9 are set in the Staples Coal Company's lower yard on the prolongation of the northerly side of the Globe wharf. The distance between the bounds is 207.3 feet. The zero line for the angular readings is the line joining the two bounds and its prolongation, the northerly side of the wharf.

Bounds Nos. 10 and 11 are set in the prolongation of the southerly side of the Globe wharf, No. 10 being near the westerly edge of the railroad embankment, and No. 11 on the easterly side of Sanford street, about 5 feet out from the fence surrounding the Sanford spinning mills. The distance between these bounds is 424.7 feet. The zero line for the angular readings taken at these bounds is the line joining them and its prolongation, the southerly side of the wharf.

Bounds Nos. 12 and 13. No. 12 is set on the top of the bluff on the easterly shore of Mount Hope Bay, about 2,220 feet, measured along the shore of the bay, from the State boundary monument on the high-water line. No. 13 is set near the western side of the right of way of the New York, New Haven and Hartford Railroad. The distance between these bounds is 270.55 feet. The zero line for the angular readings taken at these bounds is the line joining them and its prolongation.

All bounds are of granite, dressed to 6 inches square on top, and marked thus:

U. S.
HARBOR
LINE.

APPENDIX E.

IMPROVEMENT OF RIVERS AND HARBORS IN CONNECTICUT, AND PAWCATUCK RIVER, RHODE ISLAND AND CONNECTICUT.

REPORT OF MAJ. SMITH S. LEACH, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Pawcatuck River, Rhode Island and Connecticut.
2. Stonington Harbor, Connecticut.
3. Mystic River, Connecticut.
4. Thames River, Connecticut.
5. Connecticut River below Hartford, Connecticut.
6. Harbor of refuge at Duck Island Harbor, Connecticut.
7. New Haven Harbor, Connecticut.
8. Breakwaters at New Haven, Connecticut.
9. Housatonic River, Connecticut.
10. Bridgeport Harbor, Connecticut.
11. Saugatuck River and Westport Harbor, Connecticut.
12. Norwalk Harbor, Connecticut.
13. Five-mile River Harbor, Connecticut.
14. Stamford Harbor, Connecticut.
15. Harbor at Coscob and Mianus River, Connecticut.
16. Greenwich Harbor, Connecticut.

EXAMINATION AND SURVEY.

17. New London Harbor, Connecticut.
18. Milford Harbor, Connecticut.

HARBOR LINES.

19. Thames River at New London, Connecticut.
20. New Haven Harbor, Connecticut.
21. East Branch of Stamford Harbor, Connecticut.

United States Engineer Office,
New London, Conn., July 14, 1900.

General: I have the honor to transmit herewith annual report upon the works of river and harbor improvements in my charge for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

Smith S. Leach,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

E 1.

IMPROVEMENT OF PAWCATUCK RIVER, RHODE ISLAND AND CONNECTICUT.

The present approved project, that of 1895, provides for a channel of 10 feet depth at mean low water from Stonington Harbor to Westerly, with a width of 200 feet from Stonington, Conn., to Avondale, R. I., a distance of 4 miles; a width of 100 feet from Avondale to the lower wharves of Westerly, a distance of 2.75 miles, and a width of 40 feet between the upper and lower wharves of Westerly, a distance of 0.5 mile, at a total estimated cost of $200,361.60.

Under the appropriation of $15,000 in act of March 3, 1899, a contract was entered into May 23, 1899, with the Hartford Dredging Company, of Hartford, Conn., for dredging about 43,000 yards. Work was begun July 11 and discontinued December 31, 1899, 33,940 yards having been dredged. Work was resumed April 4, 1900, an extension to May 30 having been granted, and the contract was completed May 2, a total of 43,797 yards having been dredged. As a result of this work the channel, 100 feet wide and 10 feet deep, was extended down the river from a point one-third mile above to one-third mile below the dock of the Clark Thread Company, a linear distance of 3,600 feet, making the total length of the completed channel, of 10 feet depth at mean low water, 7,900 feet.

Pawcatuck River is in the collection districts of Providence and Stonington, the dividing line passing through the river. Providence and Stonington are the nearest ports of entry. The nearest light-houses are the Stonington and Watch Hill lights. The nearest fortification is Fort Michie, N. Y., 19 miles southwest.

Money statement.

July 1, 1899, balance unexpended	$15,223.69
June 30, 1900, amount expended during fiscal year	15,129.53
July 1, 1900, balance unexpended	94.16
Amount (estimated) required for completion of existing project	170,361.60
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	15,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

For Pawcatuck River, Rhode Island and Connecticut:	
March 3, 1871	$10,000.00
June 10, 1872	10,000.00
March 3, 1873	10,000.00
June 23, 1874	10,000.00
March 3, 1875	10,000.00
August 5, 1886	12,000.00
August 11, 1888	10,000.00
September 19, 1890	16,600.00
July 13, 1892	3,800.00
August 18, 1894	6,000.00
June 3, 1896	15,000.00
March 3, 1899	15,000.00
Total	128,400.00
December 5, 1895, unexpended balance deposited to credit of the United States Treasurer	399.99
Total	128,000.01

For Little Narragansett Bay, Rhode Island and Connecticut:

August 14, 1876	$5,000.00	
June 18, 1878	10,000.00	
March 3, 1879	5,000.00	
June 14, 1880	5,000.00	
March 3, 1881	5,000.00	
August 2, 1882	6,000.00	
Total		$36,000.00
Aggregate		164,000.01

Contract in force June 30, 1899, for dredging in Pawcatuck River, Rhode Island and Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract completed.
Hartford Dredging Company	May 23, 1899	June 13, 1899	July 11, 1899	[a] May 2, 1900

[a] Under extension to May 30, 1900.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through courtesy of Messrs. Maxson & Co., Westerly, R. I.]

The commerce arriving at and leaving Pawcatuck River, Rhode Island and Connecticut, by water during the calendar year ending December 31, 1899, is reported as follows:

Class of goods.	Tons.	Estimated value.
Grains	542	$9,753.75
Fish, oysters, etc. (estimated)	100	6,000.00
Lumber	5,850	76,578.73
Coal, minerals, and products	30,300	133,200.00
Fertilizers	100	2,500.00
Iron	2,200	52,800.00
Sand and gravel	2,250	2,250.00
Stone	24,200	24,200.00
Sundries (estimated)	1,200	60,000.00
Total	66,742	367,282.48

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	
Freight mainly	155	7½	200
Passenger mainly (estimated)	100	5½	80
Tugs	800	6	45
Sail:			
Freight	250	8	200
Fishing boats	1,350	3	9
Pleasure boats, large (estimated)	900	2½	6
Pleasure boats, small	850	2	3
Total	4,405	....	....

The above figures show a decrease in tonnage of freights of 64,860 tons from the amounts reported for 1898.

One new transportation company was established during the year, but is now discontinued.

E 2.

HARBOR OF REFUGE AT STONINGTON, CONNECTICUT.

The present project, that of 1880 with subsequent additions, provides for an eastern breakwater as a protection to the outer harbor; this breakwater, about one-half mile long, to extend from the vicinity of Bartletts Reef to the vicinity of Middle Ground Shoal, or until sufficient protection against southerly winds shall be obtained. The estimated cost was from $143,000 to $191,000, according to length. This did not include foundation for light-house at west end of breakwater.

The project also provides for dredging a channel across Noyes Shoal and for building a dike or water break around Stonington Point.

During the fiscal year no work has been done in furtherance of this project.

A light has been maintained on west end of uncompleted east breakwater.

Stonington Harbor is in the Stonington collection district and is a port of entry. The principal value of the harbor is as a harbor of refuge. The nearest lights are Stonington Light and Latimer Reef Light. The nearest fortification is Fort Michie, N. Y., 15 miles southwest.

Money statement.

July 1, 1899, balance unexpended	$1,058.74
June 30, 1900, amount expended during fiscal year	484.95
July 1, 1900, balance unexpended	573.79

AMOUNTS APPROPRIATED.

March 2, 1827 (survey)	$200.00	August 2, 1882	$25,000.00
May 23, 1828	20,000.00	July 5, 1884	10,000.00
April 23, 1830	16,491.67	August 5, 1886	20,000.00
June 27, 1834	262.16	August 11, 1888	8,000.00
March 3, 1873	25,000.00	September 19, 1890	12,500.00
June 23, 1874	20,000.00	July 13, 1892	12,500.00
March 3, 1875	25,000.00	August 18, 1894	5,000.00
June 18, 1878	40,000.00	June 3, 1896	5,000.00
March 3, 1879	37,500.00		
July 14, 1880	25,000.00	Total	337,453.83
March 3, 1881	30,000.00		

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of Mr. Charles T. Stanton, collector of customs, Stonington, Conn.]

The commerce arriving at and leaving Stonington Harbor, Connecticut, is estimated as follows:

Class of goods.		Tons.
Grains and forage		2,000
Fish, oysters, etc		300
Lumber and products		10,500
Coal, minerals, and products		75,000
Fertilizers		200
General merchandise:		
Arriving	132,000	
Leaving	249,000	
		381,000
Sundries		20,000
Total		489,000

The vessels entering and leaving this waterway are as follows (each entrance and departure together being counted as one):

Character or class of service.	Number.	Average draft.	Average tonnage.
Steam:		*Feet.*	*Tons.*
Freight and passenger	450	12	1,500
Freight mainly	65	10	1,000
Fishing	75	6	25
Tugs	175	7	50
Sail:			
Freight	1,000	10	150
Fishing boats	500	6	40
Pleasure boats, small	1,200	2½	....
Total	3,465	....	....

The above figures show an increase of 143,500 in tonnage from the report of 1898.
The estimated value of this commerce for 1899 is $84,984,125.
No new transportation companies have been established during the year.

E 3.

IMPROVEMENT OF MYSTIC RIVER, CONNECTICUT.

The present project for this improvement, adopted in 1890, contemplates dredging to make the channel 15 feet deep at mean low water and 100 feet wide for a length of about 4 miles and the reduction of the curvature of five bends, at an estimated cost of $30,000.

Under the appropriation of $9,600 in the act of March 3, 1899, a contract with T. A. Scott, of New London, for the removal of a ledge of rock opposite the shipyard at Noank, at $8 per cubic yard, was in force at the beginning of the fiscal year.

Work was begun July 21, 1899, and finished February 8, 1900, 466 yards having been removed under the terms of the contract in securing the required depth of 16 feet below mean low water.

Proposals were invited January 19, 1900, for dredging about 48,000 yards, and contract was entered into March 21 with the Hartford Dredging Company, of Hartford, Conn., the lowest bidder, at 9½ cents per yard. Work was begun May 4 and finished June 18, 1900, 45,655 yards having been removed.

The curvature of bends Nos. 4 and 5 was reduced to project dimensions, the width of the 15-foot channel being correspondingly increased at these points, and a shoal was removed at the mouth of the river.

Mystic River is in the New London collection district, of which New London is the port of entry. There is a light-house on Morgan Point, on the west side of the river, at its mouth. The nearest fortification is Fort Michie, 11 miles southwest.

Money statement.

July 1, 1899, balance unexpended	$9,894.84
June 30, 1900, amount expended during fiscal year	9,647.99
July 1, 1900, balance unexpended	246.85

Appropriations for the improvement of Mystic River, Connecticut, have been made as follows:

Application.	Date.	Amount.
Dredging above and just below railroad bridge and at the mouth of the river.	Sept. 19, 1890	$10,000
Dredging below railroad bridge	July 13, 1892	10,000
Dredging opposite Noank	Aug. 17, 1894	3,500
Dredging at the mouth of the river	June 3, 1896	3,500
Rock removal, etc	Mar. 3, 1899	9,600
Total		36,600

Abstract of proposals for dredging in Mystic River, Connecticut, opened by Maj. Smith S. Leach, Corps of Engineers, February 19, 1900.

[Estimated yardage, 47,368⅜ cubic yards.]

No.	Name and address of bidder.	Price per cubic yard.	Total.
1	Hartford Dredging Co., Hartford, Conn. *a*	$0.09½	$4,500.00
2	Newburgh Dredging Co	.12	5,684.21

a Accepted.

Contracts in force for (1) removal of rock, (2) dredging in Mystic River, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract completed.
Thomas A. Scott	June 1, 1899	June 12, 1899	July 21, 1899	Feb. 8, 1900
Hartford Dredging Co	Mar. 21, 1900	Apr. 5, 1900	May 4, 1900	June 18, 1900

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of R. P. Wilbur, chairman of harbor committee, Mystic Board of Trade.]

Arrival and departure of vessels.

AT MYSTIC.

[Draft, 5 to 16 feet; tonnage, 100 to 600 tons.]

Kind of vessel.	Number of round trips.	Aggregate tonnage of all trips.
Sailing vessels	60	16,860
Steamers, excursion steamers, and tugboats	300	
Barges, scows, etc	20	17,320
Total	380	34,180

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Coal	7,500	$40,350
Lumber	20,000	280,000
Silex	550	22,000
Miscellaneous	4,000	50,000
Total	32,050	392,350

The above figures show an increase of 10,483 in tonnage from the report of 1897. No new lines of transportation were established during the year.

AT NOANK (AT MOUTH OF MYSTIC RIVER).

[Through the courtesy of Robert Palmer & Son.]

	Tons.
26 new vessels, launched in 1899	18,988
232 steamboats and tugboats arrived and departed	24,200
118 schooners, barges, etc	59,332
18 cargoes yellow pine (9,712,117 feet)	10,596
4 cargoes oak (600,000 feet)	1,212
35 cargoes native lumber (2,000,000 feet)	3,500
Total	117,828

These figures include only those vessels that had business at the shipyard and do not include small vessels, nor tugboats which have been here probably a hundred times or more, of which no record has been kept.

The above figures show an increase of 55,937 in tonnage from the report of 1898.

E 4.

IMPROVEMENT OF THAMES RIVER, CONNECTICUT.

The present project for improving Thames River is that of 1866, with subsequent modifications, and consists in making and maintaining, by dredging and a system of training walls, a channel 200 feet wide from New London to Norwich, to be 16 feet deep at mean low water up to Allyn Point (about 5 miles below Norwich), and thence to Norwich to be 14 feet deep, together with dredging in Shaws Cove, New London Harbor, to make and maintain a channel 100 feet wide and 12 feet deep and an anchorage basin of the same depth and of about 7½ acres area. The estimated cost from the beginning, in 1866, is $457,600.

Under the appropriation of $20,000 in act of March 3, 1899, a contract was made June 3 with Frank H. Brainard, New York, for dredging about 140,000 yards at 11.3 cents per yard. The "middle ground" at Norwich, extending about 1,600 feet down the river from the Central Dock, was first removed to project depth by the dredging of 42,827 yards, work beginning July 8 and ending September 16. Work began in Shaws Cove, New London, September 22 and ceased December 20, the contractor's entire plant having been attached by the United States marshal. When work ceased 52,683 yards had been dredged in Shaws Cove, making the total dredged under the contract 95,510 yards. The inability of the contractor to carry on the work necessitated the annulment of his contract April 14, 1900. An agreement was effected May 14 with T. A. Scott, New London, to continue the dredging at Shaws Cove at 13.3 cents per yard, and work was begun May 17. At the end of the fiscal year 11,426 yards had been dredged by him, and the work was continuing.

A report upon the survey of New London Harbor and a project for its improvement was submitted January 27, 1900, and was printed in House Doc. No. 392, Fifty-sixth Congress, first session.

The Thames River is in the collection district of New London. The nearest lighthouse is at the mouth of the river, on the west shore. The nearest fortification is Fort Michie, N. Y., 10 miles south.

Money statement.

July 1, 1899, balance unexpended		$20,497.83
June 30, 1900, amount expended during fiscal year		14,503.40
July 1, 1900, balance unexpended		5,994.43
July 1, 1900, outstanding liabilities		1,170.80
July 1, 1900, balance available		4,823.63
Amount (estimated) required for completion of existing project		49,100.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$12,000.00	
For maintenance of improvement	8,000.00	
		20,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations for improving Thames River, Connecticut, have been made as follows:

Application.	Date.	Amount.
For previous projects:		
Removal of obstructions placed during the war of 1812	Mar. 3, 1821	$150
Survey	Mar. 2, 1829	150
Piers and dredging	July 4, 1836	10,000
Do	July 7, 1838	10,000
Do	Mar. 3, 1837	20,000
Total		40,300
For the present project:		
Dredging and survey	June 23, 1866	10,000
Dredging	Mar. 3, 1867	72,000
Do	Mar. 3, 1871	15,000
Do	June 10, 1872	10,000
Do	June 18, 1878	10,000
Do	Mar. 3, 1879	12,000
Do	June 14, 1880	22,500
Dredging and training walls	Mar. 3, 1881	80,000
Training walls	Aug. 2, 1882	35,000
Do	July 5, 1884	25,000
Training walls and dredging	Aug. 5, 1886	22,500
Repairs of training walls and dredging	Aug. 11, 1888	50,000
Dredging	Sept. 19, 1890	20,000
Do	July 13, 1892	30,000
Do	Aug. 18, 1894	12,500
Do	June 3, 1896	12,000
Do	Mar. 3, 1899	20,000
Total		408,500
Total amount appropriated since 1821		448,800

Contract in force for dredging in Thames River, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract annulled.
Frank H. Brainard	June 1, 1899	June 12, 1899	July 8, 1899	Apr. 14, 1900

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of Thomas A. Thompson, collector of customs, New London, Conn.]

FOREIGN.

Value of imports	$26,413.93
Revenue receipts, duties on imports	3,372.95

Foreign vessels:	
Entered	17
Cleared	13
Total	30
Domestic vessels:	
Entered	2
Cleared	9
Total	11

Net tonnage of vessels owned at this port.

Kind of vessel.	Number.	Tons.
Steamers	37	17,538
Sailing vessels	78	11,507
Barges	19	5,355
Total	134	34,400

COMPILED FROM VARIOUS SOURCES.

New London Harbor.

Kind of vessel.	Draft, in feet.	Number of round trips.	Aggregate tonnage of all trips.
Steamers	5 to 19	365	2,778,300
Sailing	6 to 21½	169	78,700
Barges	7½ to 20½	392	221,000
Total		926	3,078,000

FREIGHT RECEIVED AND SHIPPED BY WATER.

Chief articles.	Tons.	Estimated value.
Coal	251,000	$857,000
Lumber	8,000	88,300
Oil and naphtha	580	153,400
Fish, etc	1,700	170,000
Building materials	4,700	17,000
General merchandise	477,660	59,146,000
Total	743,640	60,431,700

Thames River.

[Exclusive of New London Harbor.]

Kind of vessel.	Draft, in feet.	Number of round trips.	Aggregate tonnage of all trips.
Steam	8	13	3,100
Sailing	10 to 15½	109	80,311
Barges	7½ to 14	607	380,872
Total		729	464,283

Thames River—Continued.

FREIGHT RECEIVED AND SHIPPED BY WATER.

Chief articles.	Tons.	Estimated value.
Coal	444,213	$1,816,318
Lumber	18,770	152,661
Iron pipe, sand, etc	2,500	100,000
Total	465,483	2,068,979

Steamboats engaged in local traffic and not covered by the above reports: One daily mail steamer from New London to Long Island; one daily steamer from New London to Plum Island; nine summer excursion boats to Norwich, Block Island, Long Island, Watch Hill, Fishers Island, and other points; one ferry to Groton.

Above boats draw from 7 to 10 feet of water, and have an aggregate tonnage of about 2,000 tons. They make from one to fifty trips each per day and carry an aggregate of 370,000 passengers and 20,000 tons of miscellaneous freight.

During the winter eleven steam yachts and four large sailing vessels were laid up at Shaws Cove, New London.

New lines of transportation established during the year are as follows:

(1) The newly established Colonial Line of steamers, plying between Halifax and West Indian ports, has selected New London as its United States port. These steamers draw 22 feet loaded.

(2) The tugboat *Alert*, owned by T. A. Scott, New London, was chartered by the United States Government to make two trips daily, beginning about July 1, 1899, between this port, Gull Island, and Plum Island, New York.

E 5.

IMPROVEMENT OF CONNECTICUT RIVER BELOW HARTFORD, CONNECTICUT.

The present project for this work, approved in 1870 and modified in 1873, 1880, 1887, and 1889, provides for enlarging the present jetties at the river's mouth and for annually dredging through the several bars in the river below Hartford, as may be necessary to maintain channels 9 feet deep and 100 feet wide, except that the channel through Saybrook Bar, at the river's mouth, is to be 12 feet deep and 400 feet wide. The estimated cost is $130,000 for permanent work and $10,000 per year for annual dredging.

Appropriations of late years have been $20,000, the amount required for two years' dredging, and no progress has been made on the permanent works, nor has the jetty channel been fully developed. This channel, now about 130 feet wide and 9 feet deep, should be widened, though possibly not to the projected width of 400 feet, and deepened.

The jetties at the mouth of the river protecting the channel across the sea bar were never completed to projected cross section, and deterioration by settlement and wave attack has made them of still slighter character, so that in their present condition they not only lack strength for their own protection from serious injury, but perform their functions very imperfectly. As a result, the channel through the sea bar is much obstructed and urgently requires the application of funds for its restoration. As heretofore reported, at least 10,000 tons of riprap should be placed on the jetties, and some repairs should also be made to Hartford Dike. It is for these purposes that the sum estimated, in addition to the $10,000 for annual maintenance, is introduced below, and to the necessity of some such provision attention is respectfully but earnestly invited.

Under the appropriation of $20,000 in the act of March 3, 1899, a contract at 9⅞ cents per yard was made May 20, 1899, with John P. Randerson, of Hartford, Conn., to cover the necessary amount of dredging during the year on the several bars, estimated at 91,138 yards. Work was begun May 18 and was in progress at the end of the last fiscal year. The work under this contract was completed August 2, 1899, a total of 99,883 yards having then been removed, distributed as follows:

	Yards.
Hartford Bar	16,434
Clay Banks Bar	4,508
Pistol Point Bar	7,592
Dividend Bar	7,008
Press Barn Bar	6,508
Glastonbury Bar	8,004
Searles Shoal	3,120
Potash Channel	8,258
Brockways Channel	22,331
Saybrook Bar	16,120

Under the balance of the appropriation of March 3, 1899, reserved for the summer of 1900, the work of annual dredging was advertised March 16, 1900, and a contract was made April 27 with the Hartford Dredging Company of Hartford, the only bidder, at 12 cents per yard, estimated yardage being 66,500. Work was begun under this contract June 5, 1900, and was in progress at the close of the fiscal year.

The Connecticut River is in the collection district of Hartford. There is a lighthouse on Saybrook Point, on the west shore of the river at its mouth, and another at the end of the west jetty; besides which there are three small beacon lights and several range lights in the river which are maintained by the United States. Fort Terry, N. Y., is the nearest fortification, 11 miles southeast of Saybrook Point.

Money statement.

July 1, 1899, balance unexpended		$19,058.75
June 30, 1900, amount expended during fiscal year		9,953.19
July 1, 1900, balance unexpended		9,105.56
July 1, 1900, outstanding liabilities	$1,603.76	
July 1, 1900, amount covered by uncompleted contracts	6,382.24	
		7,986.00
July 1, 1900, balance available		1,119.56
Amount (estimated) required for completion of existing project		110,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to balance available July 1, 1900:		
For works of improvement	$10,000.00	
For maintenance of improvement	10,000.00	
		20,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations for improving the Connecticut River below Hartford have been made as follows:

Application.	Date.	Amount.
Dredging at Saybrook Bar	July 4, 1836	$20,000.00
Dredging at Saybrook Bar (the unexpended balance of 1836 reappropriated)	Mar. 3, 1839	....
Balance due contractor under previous appropriation	Mar. 1, 1843	3,471.57
Dredging at Pratts Ferry, Pistol Point, Mouse Island; piling at Hartford	July 11, 1870	20,000.00
Dredging at Hartford, Clay Banks, Pier I, Pier J, Pratts Ferry, Glastonbury, Pistol Point, and Chester Rock	Mar. 3, 1871	35,000.00
Dredging at Pratts Ferry, Pistol Point, and Saybrook jetty	June 10, 1872	40,000.00
Dredging at Hartford, Pratts Ferry, Glastonbury, and Saybrook jetty	Mar. 3, 1873	20,000.00
Dredging at Hartford, Pratts Ferry, Saybrook, Saybrook jetties	June 23, 1874	20,000.00
Dredging at Hartford, Pratts Ferry, Glastonbury, Saybrook jetties	Mar. 3, 1875	20,000.00
Dredging at Hartford, Pratts Ferry, Glastonbury, Saybrook jetties, Salmon River dredging	Aug. 14, 1876	20,000.00
Compensation for previous dredging	—— 1878	4,203.00
Saybrook jetties, survey from Hartford to Rocky Hill	June 18, 1878	30,000.00
Dredging at Hartford, Press Barn, Glastonbury	Mar. 3, 1879	10,000.00
Dredging at Hartford, Glastonbury, and Saybrook jetties	June 14, 1880	10,000.00
Dredging at Hartford, Pratts Ferry, Glastonbury, Glastonbury wing dam, Saybrook jetties	Mar. 3, 1881	30,000.00
Dredging at Hartford, Clay Banks, Pratts Ferry, Press Barn, Glastonbury, Dividend, Pistol Point, and Salmon River, Hartford dike	Aug. 2, 1882	45,000.00
Dredging at Hartford, Clay Banks, Pratts Ferry, Press Barn, Glastonbury, Dividend, Pistol Point, Mouse Island, and between Saybrook jetties, extending west jetty at Saybrook	July 5, 1884	35,000.00
Compensation for previous dredging	Mar. 3, 1885	4,745.43
Dredging at Hartford, Clay Banks, Naubuc, Press Barn, Glastonbury, Dividend, Pistol Point, and Haddam Island; repairs of Hartford dike and Saybrook jetties	Aug. 5, 1886	26,250.00
Annual dredging at Hartford, Clay Banks, Press Barn, Glastonbury, Dividend, Brockways	Aug. 12, 1888	10,000.00
Annual dredging at Hartford, Clay Banks, Press Barn, Glastonbury, Dividend, Pistol Point, Mouse Island, Haddam Island	Sept. 19, 1890	12,500.00
Annual dredging at Hartford, Clay Banks, Naubuc, Press Barn, Glastonbury, Dividend, Pistol Point, Mouse Island, Sears Shoal, Chester Rock, Devils Reef, Calves Island	July 13, 1892	20,000.00
Annual dredging upon several bars below Hartford, in progress	Aug. 18, 1894	20,000.00
Do	June 3, 1896	20,000.00
Do	Mar. 3, 1899	20,000.00
Total	....	496,170.00

Abstract of proposals for dredging in the Connecticut River, Connecticut, opened by Maj. Smith S. Leach, Corps of Engineers, April 16, 1900.

[Estimated yardage, 66,500 cubic yards.]

No.	Name and address of bidder.	Price per cubic yard.	Total.
1	Hartford Dredging Co., Hartford, Conn. *a*	$0.12	$7,980.00

a Accepted.

Contracts in force for dredging in Connecticut River, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract completed.
John P. Randerson	May 20, 1899	June 15, 1899	May 18, 1899	Aug. 2, 1899
Hartford Dredging Co	Apr. 27, 1900	June 4, 1900	June 5, 1900	....

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

[Through courtesy of Mr. C. C. Goodrich, general manager of the Hartford and New York Transportation Company.]

Arrivals and departures of vessels.

[Draft, 6 to 12 feet; tonnage, 100 to 1,600 tons.]

Kind of vessel.	Number of round trips.	Aggregate tonnage of all trips.
Steamers	400	850,000
Sailing vessels	250	....
Barges	750	....
Total	1,400	850,000

Freight received and shipped by water.

Chief articles.	Tons.	Value.
Receipts:		
Coal	380,000	$36,000,000
Stone	65,000	
Miscellaneous goods	25,000	
Shipments:		
Stone, estimated	75,000	11,000,000
Wood, lumber, etc	65,000	
Miscellaneous goods	90,000	
Total receipts and shipments	700,000	47,000,000

These figures show an increase in tonnage of freights of 35,000 tons over that reported for 1898.

The only new line of transportation established during the year was a day line of steamboats between Hartford and Saybrook, which was operated during the three summer months.

The above is a close estimate, much of it being based on weights and cubic measurements of freights carried by the company.

Government improvements are and have been of great importance in attaining these results. The usual dredging should be continued. The dike at Hartford should be increased to the height originally intended. As it is at present it is not of practical use.

E 6.

IMPROVEMENT OF HARBOR OF REFUGE AT DUCK ISLAND, CONNECTICUT.

The project for this improvement consists in building three breakwaters, aggregating 5,880 feet in length, at an estimated cost of $463,540.

No work was done on this improvement during the fiscal year from lack of sufficient funds. A light was maintained at the end of the uncompleted structure until August 8, 1899, when it was transferred to the Light-House Establishment.

The west breakwater, as now constructed, affords a limited shelter from south and southeast storms, and is to some extent sought for that purpose. It is now 2,770 feet long, or within 230 feet of its projected length. Its western extremity is in relatively deep water and on soft bottom. The increased depth makes a larger cross section requisite to give the same height and crown, and the softness of the bottom, by allowing subsidence of the entire structure, increases the amount of stone required for repairs. For these reasons the unit cost is considerably increased, and the horizontal distance gained with a given amount of funds is diminished. The end of the breakwater is now within 230 feet of its projected position; and, in my opinion, the additional advantage gained by this relatively slight extension will not be worth its cost.

I therefore suggest the propriety of considering the west breakwater as now completed in accordance with the project, with the exception of the necessary repairs to compensate for settlement on the outer end and the proper strengthening of that end, with a view to its permanency and of making it in some sense a beacon. If this idea be adopted, future appropriations will be applied to the easterly breakwater, a situation where under present conditions a given sum of money will produce results of much greater benefit than if applied in the extension of the westerly breakwater as originally projected.

Duck Island is in the collection district of Hartford. The nearest light-house is at Saybrook Point, at the mouth of the Connecticut River, about 8 miles eastward. There is a light vessel on Long Sand Shoal, about 5 miles to the southeast. The nearest fortification is Fort Terry, New York, 16 miles southeast.

Money statement.

July 1, 1899, balance unexpended	$159.80
June 30, 1900, amount expended during fiscal year	66.20
July 1, 1900, balance unexpended	93.60
Amount (estimated) required for completion of existing project	349,540.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	25,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for harbor of refuge at Duck Island Harbor, Connecticut, have been made as follows:

Application.	Date.	Amount.
Westerly breakwater:		
946 feet	Sept. 19, 1890	$25,000
714 feet	July 13, 1892	35,000
725 feet and repairs	Aug. 17, 1894	30,000
385 feet and repairs	June 3, 1896	24,000
Total		114,000

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

No complete record of the number of vessels passing this harbor of refuge is kept. It is believed to be approximately two-thirds of the number passing the New Haven breakwater, which is reported as 151,356 for the year 1895.

The following record of vessels anchoring inside the breakwater during the months of June, July, August, and September, 1899, serves to show to what extent this harbor is used for refuge:

Schooners	85	Schooner yachts	8
Sloops	21	Sloop yachts	88
Steam yachts	11		
Steam barges	20	Total	233

E 7.

IMPROVEMENT OF NEW HAVEN HARBOR, CONNECTICUT.

The present project for this work, adopted in 1899, consists in dredging a channel 20 feet deep, 400 feet wide, and 4 miles long from Long Island Sound to Canal Dock, a channel 20 feet deep, 300 feet wide, and one-half mile long from Canal Dock to Tomlinsons Bridge, and three anchorage basins of 20, 16, and 12 feet depths, respectively, estimated to require the removal of 3,287,000 yards, at a cost not to exceed $345,000.

In accordance with the act of March 3, 1899, under the appropriation of $50,000 for the first year's work, proposals were solicited May 9, and a continuing contract, covering the entire project, was entered into July 31, 1899, with John T. Regan, which contract specifies that such part of the appropriation of March 3, 1899, as is earned prior to August 1, 1900, shall be at 6 cents per yard, and the remainder, if there be any, must be earned at 3 cents per yard before any subsequent appropriation can be drawn upon, and such part of any subsequent appropriation as is not earned at 6 cents per yard within twelve months after notification to commence work under such appropriation must be earned at 3 cents per yard before any appropriation subsequent thereto can be drawn upon.

Work under the contract began December 8, 1899, with dredging in the main channel at a point outside the lower bar and about 1,500 feet inside the opening between the east and middle breakwaters. From this point to a point opposite the shore arm of Sandy Point Dike, a linear distance of 10,700 feet, a channel 200 feet wide and not less than 20 feet deep, being the west half of the main channel of the project, was completed April 25, at which date 340,349 yards had been dredged. From the latter point a channel 80 feet wide and not less than 20 feet deep is being dredged, closely following the natural channel, with the expectation that by taking advantage of the deepest water now existing within project limits, the depth of 20 feet may, under the first appropriation, be carried to the wharves about 2 miles above Sandy Point Dike. At the end of the fiscal year work was in progress on the 80-foot channel described above, a total of 474,304 yards having been removed under the contract.

It is proposed to apply the appropriation of $50,000 in the act of June 6, 1900, to widening the 80-foot channel to 200 feet or more and extending it to Tomlinsons Bridge and to developing the anchorage basins.

New Haven, the port of entry for the collection district of New Haven, is situated at the head of New Haven Harbor, about 3½ miles from Long Island Sound. There is a light-house on Southwest Ledge, at the mouth of the harbor. The nearest fortification is Fort Terry, N. Y., 37 miles east from Southwest Ledge Light-House.

Money statement.

July 1, 1899, balance unexpended		$50,304.66
Amount appropriated by sundry civil act approved June 6, 1900		50,000.00
		100,304.66
June 30, 1900, amount expended during fiscal year		24,338.17
July 1, 1900, balance unexpended		75,966.49
July 1, 1900, outstanding liabilities	$8,688.24	
July 1, 1900, amount covered by uncompleted contracts	168,761.76	
		177,450.00

Amount (estimated) required for completion of existing project	116,915.34
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	50,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for the improvement of New Haven Harbor have been made as follows:

Application.	Date.	Amount.
Removal of Middle Rock, not expended until 1867	Aug. 30, 1852	$6,000
Removal of rocks	July 11, 1870	15,000
Dredging (13 feet) above Fort Hale	Mar. 3, 1871	40,000
Dredging (16 feet) Fort Hale Bar, and removal of rocks	June 10, 1872	35,000
Dredging (16 feet) Fort Hale Bar	Mar. 3, 1873	25,000
Dredging (13 feet) above Long wharf	Mar. 3, 1875	10,000
Dredging (16 feet) Long wharf to Fort Hale	June 18, 1878	25,000
Dredging (16 feet) above Long wharf	Mar. 3, 1879	15,000
Do	June 14, 1880	15,000
Dredging (16 feet) Long wharf to Fort Hale	Mar. 3, 1881	15,000
Sandy Point Dike	Aug. 2, 1882	30,000
Dredging (18, 12, and 8 feet) above long wharf	July 5, 1884	10,000
Sandy Point Dike	Aug. 5, 1886	20,000
Do	Aug. 11, 1888	15,000
Dredging	Sept. 19, 1890	15,000
Do	July 13, 1892	15,000
Dredging (Fort Hale Bar)	Aug. 18, 1894	10,000
Resurvey and dredging	June 3, 1896	10,000
Dredging (20 feet) main channel, sound to Long wharf	Mar. 3, 1899	50,000
Dredging (20 feet) main channel and anchorage basins	June 6, 1900	50,000
Total		426,000

All appropriations, except the last two, were applied to previous projects.

Contract in force June 30, 1900, for dredging in New Haven Harbor, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Character of contract.
John T. Regan, Chicago, Ill	June 28, 1899	July 20, 1899	Dec. 8, 1899	Continuing.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

[Through courtesy of Mr. Henry C. Rowe, chairman of harbor committee.]

FOREIGN.

Value of imports	$213,424.29
Revenue receipts	57,813.85
Total	271,238.14

Arrival and departure of vessels.

Foreign vessels:[1]	
Entered	54
Cleared	44
Total	98
Domestic vessels:[2]	
Entered	16
Cleared	5
Total	21

Net tonnage of vessels owned at this port.

Steamers	14,900
Sailing vessels	35,302
Barges	16,889
Total	67,091

COASTWISE.

Arrival and departure of vessels.

[Draft, 6 to 22 feet; tonnage, 100 to 2,000 tons.]

Kind of vessel.	Number of round trips.	Aggregate tonnage of all trips.
Steamers of all kinds	13,648	3,097,500
Sailing vessels	6,750	4,541,000
Barges in tow, scows, etc	8,295	3,875,000
Total	28,693	11,513,500

Freight received and shipped.

Chief articles.	Tons.	Estimated value.
Coal received:		
Bituminous	658,000	$1,974,000
Anthracite	500,000	2,125,000
Iron received and shipped	186,000	5,580,000
Lumber received, 77,800,000 feet	116,700	1,127,000
Oysters received and shipped, 1,500,000 bushels	60,000	780,000
Miscellaneous merchandise:		
Received	1,020,000	115,000,000
Shipped	900,000	135,000,000
Total	3,440,700	261,586,000

The above figures show an increase of 388,700 tons of freight over the report for 1896, the last report of value received.

No new lines of transportation have been established since January 1, 1896.

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[1] Including 10 American vessels from foreign ports.

[2] Including only vessels required by law to enter and clear from and to some "Great District" outside that in which New Haven is situated.

E 8.

CONSTRUCTION OF BREAKWATERS AT NEW HAVEN, CONNECTICUT.

The present project for this work consists in building four breakwaters for a harbor of refuge at the entrance to New Haven Harbor, at an estimated cost of $2,151,134. These breakwaters are designated as follows: The east, the Ludington Rock, the west, and the northeast, with lengths, respectively, of 3,450 feet, 5,000 feet, about 3,000 feet, and 1,200 feet, aggregating 12,650 linear feet. Of the total length of breakwaters contemplated in the project, there have been built to this date the east, 3,450 feet long; 4,500 of the Ludington Rock, and 1,490 feet of the west breakwater, making a total of 9,440 feet, and leaving 3,210 feet to complete. The part built has not the originally proposed section, but no failures have occurred due to that cause, and in the absence of any the reduced section would seem to be sufficient.

The last work on these breakwaters closed on February 1, 1897. Nothing has been done during the fiscal year.

Four lights were maintained on the breakwaters until June 28, 1899, when three of them were transferred to the Light-House Establishment.

New Haven, the port of entry for the collection district of New Haven, is situated at the head of New Haven Harbor, about 4 miles north of the breakwaters. There is a light-house on Southwest Ledge, the west terminus of the east breakwater. The nearest fortification is Fort Terry, New York, 37 miles east.

Money statement.

July 1, 1899, balance unexpended	$1,745.91
June 30, 1900, amount expended during fiscal year	245.05
July 1, 1900, balance unexpended	1,500.86
Amount (estimated) required for completion of existing project	1,316,134.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	100,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations for constructing breakwater at New Haven, Conn., have been made as follows:

Application.	Date.	Amount.
Easterly breakwater	Mar. 3, 1879	$30,000
Do	June 14, 1880	30,000
Do	Mar. 3, 1881	60,000
Do	Aug. 2, 1882	60,000
Do	July 5, 1884	40,000
Do	Aug. 5, 1886	75,000
Do	Aug. 11, 1888	75,000
Middle or Ludington Rock breakwater	Sept. 19, 1890	120,000
Do	July 13, 1892	120,000
Middle and west breakwater	Aug. 18, 1894	125,000
West breakwater	June 3, 1896	100,000
Total		835,000

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

These statistics have not been received. The last statement obtained was for 1895, which is as follows:

Vessels passing New Haven breakwater.

Men-of-war	16
Steamers of all kinds	43,200
Steamships	1,800
Ships, barks, and brigs	1,690
Schooners and sloops of all kinds	54,250
Barges in tow, scows, etc	50,400
Total	151,356

These records are not complete, as some vessels pass unobserved in the night or in thick weather.

During the year past 92 vessels have been observed under and close to the breakwater for refuge, and in the mouth of the harbor, partly under the protection of the breakwaters, 3,925 vessels have been observed.

E 9.

IMPROVEMENT OF HOUSATONIC RIVER, CONNECTICUT.

The present project for this work consists in making and maintaining a channel 7 feet deep at mean low water from Long Island Sound to the head of navigation, about 13 miles, to be 100 feet wide in the river and 200 feet wide over the bar at the mouth, by dredging, removing Drews Rock, building a jetty at Sow and Pigs Reef, a dike at the bend below Stratford, and a breakwater 5,750 feet long to protect the channel over the bar at the mouth of the river, all at an estimated cost of $275,500. Up to July 1, 1898, this project required only the enlargement of the breakwater, an extension of the dike, and dredging on the bars to make it complete.

Under the appropriation of $15,000 in act of March 3, 1899, the work of dredging on the several bars was advertised April 18, 1899, and one bid was received. The price named, 33 cents per yard, was considered excessive, and the bid was rejected. The work was readvertised January 19, 1900, and a contract was entered into March 22 with the Newburgh Dredging Company, the lowest bidder, at 28 cents per yard.

At the close of the fiscal year work under the contract had not been begun.

A small light was maintained on the outer end of the breakwater at the mouth of the river until November 20, 1899, when it was transferred to the Light-House Establishment.

The Housatonic River is the boundary between the collection districts of New Haven and Fairfield. The nearest light-house is on Stratford Point, at the mouth of the river. The nearest work of defense is Fort Schuyler, Throgs Neck, about 43 miles to the southwest.

Money statement.

July 1, 1899, balance unexpended		$16,326.13
June 30, 1900, amount expended during fiscal year		414.80
July 1, 1900, balance unexpended		15,911.33
July 1, 1900, amount covered by uncompleted contracts		4,900.00
July 1, 1900, balance available		11,011.33
Amount (estimated) required for completion of existing project		47,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$20,000.00	
For maintenance of improvement	4,000.00	
		24,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations for improving Housatonic River, Connecticut, have been made as follows:

Application.	Date.	Amount.
Sow and Pigs Jetty, dredging	Mar. 3, 1871	$15,000
Drew Rock Jetty, dredging	June 10, 1872	15,000
Dredging	Mar. 3, 1873	10,000
Do	June 23, 1874	10,000
Do	Mar. 3, 1875	5,000
Do	June 18, 1878	5,000
Do	June 14, 1880	2,000
Do	Mar. 3, 1881	2,000
Removing Drew Rock and Jetty in 1887	Aug. 2, 1882	2,000
Do	July 5, 1884	2,500
Do	Aug. 5, 1886	5,000
Commencing breakwater, dredging	Aug. 11, 1888	35,000
Extending breakwater, dredging	Sept. 19, 1890	35,000
Extending breakwater, dike and dredging	July 13, 1892	20,000
Do	Aug. 18, 1894	25,000
Enlarging breakwater and dredging	June 3, 1896	25,000
Dredging	Mar. 3, 1899	15,000
Total		228,500

Abstract of proposals for dredging in Housatonic River, Connecticut, opened by Maj. Smith S. Leach, Corps of Engineers, February 19, 1900.

[Estimated yardage, 17,855 cubic yards.]

No.	Name and address of bidder.	Price per cubic yard.	Total.
a1	Newburgh Dredging Co., Newburgh, N. Y	$0.28	$4,999.40
2	Hartford Dredging Co., Hartford, Conn	.35	6,249.25

a Accepted.

Contract in force June 30, 1900.

Name of contractor.	Date of contract.	Date of approval.	Work to begin.	Contract expires.
Newburgh Dredging Co	Mar. 22, 1900	May 9, 1900	June 26, 1900	Sept. 25, 1900

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of the F. Hallock Company, Derby, Conn.]

Arrival and departure of vessels.

[Draft, 2 to 8 feet; tonnage, 3 to 450 tons.]

Kind of vessel.	Number of round trips.	Aggregate tonnage of all trips.
Steamers of all kinds, sailing vessels, and barges	Not recorded.	64,712

Freight received by water.

Chief articles.	Tons.	Estimated value.
Coal	58,695	$234,780
Iron	2,314	69,500
Lumber, 200 M. feet	200	3,600
Sand, cement, and stone	3,503	93,270
Total	64,712	401,150

The above statistics, based on stevedore's records at Derby and Shelton, do not cover any of the river traffic, except to these points. They show a decrease of 12,288 tons from the tonnage reported for 1898, due to advance in prices.

E 10.

IMPROVEMENT OF BRIDGEPORT HARBOR, CONNECTICUT.

The present project for this work, adopted in 1899, consists in (*a*) dredging a main channel 18 feet deep, 300 feet wide south of the inner beacon and 200 feet wide north of it; an anchorage basin 18 feet deep, 2,000 feet by 500 feet; two anchorage basins 12 feet deep; channels 12 feet deep, 100 feet wide, and 1 mile long each in Poquonnock River and Yellow Mill Cove; channels 9 feet deep, 100 feet wide, and three-fourths, one-eighth, and one-half mile long in Johnsons, Cedar, and Burr creeks, respectively, estimated to require the removal of 2,226,500 yards; (*b*) stonework for the repair and maintenance of the four breakwaters now built and for the construction and maintenance of shore protection on Fayerweather Island, estimated to require 12,500 tons; all at an estimated cost of $300,000.

In accordance with the act of March 3, 1899, and under the appropriation of $50,000 for the first year's work, proposals were invited May 9, and a continuing contract, covering the entire project, was entered into July 31, 1899, with Hughes Bros. & Bangs, which contract specifies that such part of the appropriation of March 3, 1899, as is earned prior to August 1, 1900, shall be at 5 cents per yard, and the remainder, if there be any, must be earned at 2½ cents per yard before any subsequent appropriation can be drawn upon, and such part of any subsequent appropriation as is not earned at 5 cents per yard within twelve months after notification to commence work under such appropriation must be earned at 2½ cents per yard before any appropriation subsequent thereto can be drawn upon.

Said contract also includes 12,500 to 20,000 tons of stonework, the price being $2 per ton when delivery does not fall below 1,000 tons per month during the period covered by notification, and $1 per ton when delivery falls below this limit.

The first year's work will be applied, probably in the order named, to the 18-foot main channel from Long Island Sound to the lower bridge, the 12-foot anchorage below and adjacent to this bridge, and the Johnsons River 9-foot channel. At the end of the fiscal year work under the contract had not been begun.

Bridgeport, the port of entry for the collection district of Fairfield, is situated about 2 miles from Long Island Sound, at the head of Bridgeport Harbor. There is a light-house at the entrance to the harbor, and a small harbor light at the Inner Beacon.

Fort Schuyler, Throgs Neck, at the head of Long Island Sound, is about 41 miles to the southwest, and is the nearest work of defense.

Money statement.

July 1, 1899, balance unexpended		$50,517.17
Amount appropriated by sundry civil act approved June 6, 1900		50,000.00
		100,517.17
June 30, 1900, amount expended during fiscal year		365.67
July 1, 1900, balance unexpended		100,151.50
July 1, 1900, outstanding liabilities	$5.00	
July 1, 1900, amount covered by uncompleted contracts	151,325.00	
		151,330.00
Amount (estimated) required for completion of existing project		63,178.50
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		63,178.50
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

Appropriations for the improvement of Bridgeport Harbor, Connecticut, have been made as follows:

Application.	Date.	Amount.	
Dredging outer bar	July 4, 1836	$10,000	
Dredging outer and inner bars	Aug. 30, 1852	10,000	$20,000
Dredging and 521 feet of breakwater	Mar. 3, 1871	20,000	
Dredging and 859 feet of breakwater	June 10, 1872	40,000	
Dredging inner bar and upper harbor	Mar. 3, 1873	30,000	
Dredging, bridge to Long Island Sound (9 feet)	June 23, 1874	20,000	
Dredging, bridge to Long Island Sound (12 feet)	Mar. 3, 1875	15,000	
Dredging upper harbor (9 feet)	Aug. 14, 1876	10,000	
Dredging above bridge and outer bar (9 and 12 feet)	June 18, 1878	10,000	
Dredging, bridge to Long Island Sound (12 feet)	Mar. 3, 1879	10,000	
Do	June 14, 1880	10,000	
Dredging about Inner Beacon (12 feet)	Mar. 3, 1881	10,000	
Dredging between Inner Beacon and railway wharf (12 feet)	Aug. 2, 1882	10,000	
Do	July 5, 1884	5,000	
Do	Aug. 5, 1886	20,000	
Dredging above horse-railroad bridge (9 feet)	Aug. 11, 1888	10,000	
Dredging and breakwater at Tongue	Sept. 19, 1890	20,000	
Dredging between Inner Beacon and Naugatuck wharf	July 13, 1892	20,000	
Dredging outer bar (15 feet)	Aug. 18, 1894	10,000	
Dredging between Outer Beacon and Long Island Sound	June 3, 1896	28,000	
Dredging and stonework	Mar. 3, 1899	50,000	
Do	June 6, 1900	50,000	398,000
Total			418,000

All appropriations except the last two were applied to previous projects.

Contract in force June 30, 1900, for stonework and dredging in Bridgeport Harbor, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Character of contract.
Hughes Bros. & Bangs	July 31, 1899	Aug. 25, 1899	....	Continuing.

COMMERCIAL STATISTICS FOR THE YEAR 1899.

[Through the courtesy of Frank J. Naramore, collector of customs, Bridgeport, Conn.]

Foreign.

Value of imports	$367,076.00
Revenue receipts	113,489.36

Foreign vessels:	
Entered	30
Cleared	30
Total	60
Domestic vessels:	
Entered	3
Cleared	3
Total	6

Net tonnage of vessels owned at this port.

Kind of vessel.	Number.	Tons.
Steamers	27	5,355
Sailing vessels	64	3,881
Barges	2	403
Total	93	9,639

The number of vessels given as owned at this port covers only those of over 5 tons measurement.

Arrival and departure of vessels (coastwise).

[Draft, 12 to 18 feet; tonnage, 100 to 1,250 tons.]

Kind of vessel.	Number of round trips.	Aggregate tonnage of all trips.
Steamers	6,668	*a* 1,240,000
Sailing vessels	4,810	
Barges	5,013	
Total	15,991	....

a Estimated.

Freight received and shipped by water.

	Tons.	Estimated value.
Receipts	710,180	$10,652,700
Shipments	304,384	4,564,760
Total	1,014,564	15,217,460

The above figures show a decrease of 181,999 tons from those reported for 1898 No new lines of transportation were established during the year.

E II.

IMPROVEMENT OF SAUGATUCK RIVER AND WESTPORT HARBOR, CONNECTICUT.

The present project for this work, adopted in 1892 and modified June 3, 1896, consists in dredging a channel 4 feet deep at mean low water and 60 feet wide up to the village of Westport, in removing rocks and bowlders from the channel, and in repairing the breakwater at Cedar Point, at an estimated cost of $18,000.

At the completion of work in May, 1896, the channel had been dredged 40 to 60 feet wide and 4 feet deep at mean low water to the lowest wharf at Westport, and vessels of 10 feet draft could reach that point at high tide; no dredging has since been done.

At the completion of repairs and extension of Cedar Point Breakwater in May, 1897, the total length was about 500 feet, all in good condition. At the completion of the contract for removing bowlders from the channel in July, 1897 103 tons had been removed, sufficing to clear the natural channel from the railroad bridge to Westport.

A report in the matter of the request of certain parties for the reopening of the canal through the "great marsh" at the mouth of Westport Harbor was submitted after careful consideration of all available data and an examination of the locality by the district officer. The conclusion was adverse to the request of the petitioners, on the grounds, chiefly, of difficulty of maintenance and impracticability of enlargement to meet future needs. This canal has been practically abandoned since 1883.

No work was done on this improvement during the fiscal year, on account of insufficiency of funds.

Saugatuck River is in the Fairfield collection district, of which Bridgeport is the port of entry. The nearest light-house is on Sheffield Island, 5 miles southeast from the river's mouth. Fort Schuyler, Throgs Neck, at the head of Long Island Sound, 32 miles southwest, is the nearest work of defense.

Money statement.

July 1, 1899, balance unexpended	$549.10
June 30, 1900, amount expended during fiscal year	11.20
July 1, 1900, balance unexpended	537.90
Amount (estimated) required for completion of existing project	5,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	5,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for this harbor have been made as follows:

Title.	Application.	Date.	Amount.
Survey of river and harbor of Saugatuck.	Survey	May 20, 1826	$400
Removing obstructions in river and protecting harbor at Cedar Point.	Chiefly constructing breakwater at Cedar Point.		
Removing obstructions in river	As stated, location not known	Apr. 30, 1830	28
For further securing the beach at Cedar Point.	Continuing breakwater	July 4, 1836	1,000
Harbor of Westport	Canal construction	do	3,000
Do	do	May 3, 1837	3,734
Do	do	July 7, 1838	4,782
Deepening and improving Westport Harbor, unexpended balance reverted to Treasury in 1870; reappropriated in 1871.	Chiefly in surveys in 1872	Mar. 2, 1867	2,500
Westport Harbor	Repairing and extending breakwater on Cedar Point.	July 11, 1870	2,500
Saugatuck River, improvement of the natural channel.	Dredging	July 13, 1892	7,000
Saugatuck River, for completion	do	Aug. 18, 1894	3,000
Westport Harbor, Connecticut	Removal of rocks and repair of breakwater.	June 3, 1896	3,000
Total			32,444

The appropriations since 1892 have been applied to the present project.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of Mr. Rufus Wakeman, Saugatuck, Conn.]

Arrival and departure of vessels.

WESTPORT HARBOR.

[Draft, 4 to 10½ feet; tonnage, 50 to 300.]

Kind of vessels.	Round trips.	Aggregate tonnage of all trips.
Sailing vessels	18	2,700
Steamers of all kinds	56	10,800
Barges, scows, etc	35	7,000
Total	109	20,500

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Coal	11,000	$44,000
Lumber (390,000 feet B. M.)	780	15,600
Miscellaneous	8,720	13,080
Total	20,500	72,680

The above figures show a decrease of 2,050 in tonnage of freight from that reported for the year 1898.

No new lines of transportation have been established during this year.

E 12.

IMPROVEMENT OF NORWALK HARBOR, CONNECTICUT.

The present project for this work, adopted August 17, 1894, and extended June 3, 1896, provides for dredging and removing the shoal called Ferrys Point, on the west side of the channel, between the railroad dock and Jenning's wharf, making 6 feet depth at mean low water; in widening two bends at the harbor entrance, making a depth of 10 feet at mean low water, and in dredging to widen to 150 feet and deepen to 10 feet the channel at mean low water up to South Norwalk.

Estimated cost, $77,000, and $2,000 per annum for maintenance.

Under the appropriation of $2,000, in act of March 3, 1899, a contract for dredging for maintenance of existing channels was made May 27, 1899, with the Newburgh Dredging Company, at 19 cents per yard. The total amount dredged was 10,500 yards, of which 2,500 yards was dredged in the vicinity of Jennings Point, 3,500 yards near Oyster Shell Point, and the remainder along the docks at Norwalk, all to a depth of 6 feet at mean low water. Many large bowlders and possibly some ledge rock were encountered near the upper end of the channel at Norwalk, and some blasting will be required here to obtain project depth.

Norwalk is in the Fairfield collection district, and is 11 miles west of Bridgeport, the port of entry. Norwalk Light-House is on Sheffield Island, at the harbor entrance. The nearest work of defense is Fort Schuyler, Throgs Neck, at the head of Long Island Sound, about 29 miles southwest.

Money statement.

July 1, 1899, balance unexpended		$2,416.99
June 30, 1900, amount expended during fiscal year		2,247.24
July 1, 1900, balance unexpended		169.75
Amount (estimated) required for completion of existing project		50,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$13,000.00	
For maintenance of improvement	2,000.00	
		15,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations for improving Norwalk Harbor, Connecticut, have been made as follows:

Application.	Date.	Amount.
For previous projects:		
Dredging (6 feet) above South Norwalk	June 10, 1872	$10,000
Do	Mar. 3, 1873	10,000
Do	June 23, 1874	10,000
Dredging (6 feet) below South Norwalk	Mar. 3, 1875	7,000
Do	June 18, 1878	6,000
Dredging (6 feet) above and below South Norwalk	Mar. 8, 1879	10,000
Dredging (6 feet) below South Norwalk	June 14, 1880	5,000
Dredging (8 feet) below and (6 feet) above South Norwalk	Mar. 8, 1881	5,000
Dredging (6 feet) above South Norwalk	Aug. 2, 1882	5,000
Dredging (8 feet) below South Norwalk	July 5, 1884	5,000
Dredging (6 feet) above South Norwalk	Aug. 5, 1886	3,000
Dredging (6 feet) above and (8 feet) below South Norwalk	Aug. 11, 1888	3,000
Do	Sept. 19, 1890	4,000
Total		83,000

Application.	Date.	Amount.
For present project, adopted 1894:		
Dredging (6 feet) at Ferrys Point	Aug. 18, 1894	15,000
Dredging (10 feet) below South Norwalk	June 3, 1896	10,000
Dredging	Mar. 3, 1899	2,000
Total for present project		27,000
Total appropriated for improvement of Norwalk Harbor, Connecticut		110,000

Contract in force for dredging about 10,500 yards in Norwalk Harbor, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract completed.
The Newburgh Dredging Co	May 27, 1899	July 27, 1899	Aug. 8, 1899	Aug. 25, 1899

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of Mr. John H. Ferris, South Norwalk, Conn.]

Arrivals and departures of vessels.

[Draft, 4 to 14 feet; tonnage, 50 to 600 tons.]

Kind of vessel.	Round trips.
Steamers of all kinds	624
Sailing vessels	126
Barges	269
Total	1,019

The above does not include the frequent trips made by small steamers and sailboats employed in the oyster industry.

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Coal	78,580	$314,320
Building materials	25,875	123,540
Miscellaneous materials	48,300	5,614,250
Oysters and shellfish	12,000	334,000
Total	164,755	6,386,110

The above figures show an increase of 18,710 tons from the report for the calendar year 1896, and the estimated value of the freight is $1,201,761 greater than for 1896.

The work that was done in 1897 below the bridge was quite helpful to commerce as far as it went, but was discontinued at the most important place in the harbor, namely, from Burritts Point up the harbor. This should be done, that we may get the benefit of what has already been done.

No new lines of transportation were established during the year.

E 13.

IMPROVEMENT OF FIVE-MILE RIVER HARBOR, CONNECTICUT.

The adopted project for this harbor consists in dredging a channel 8 feet deep at mean low water, and 100 feet wide from Long Island Sound to the head of the harbor, a distance of about 6,000 feet, at an estimated cost of $45,000.

No work was done on this improvement during the fiscal year from lack of sufficient funds.

At the completion of work under the last contract in June, 1899, the project width of 100 feet and depth of 8 feet had been secured for a distance of about 1,900 feet up the harbor from the Sound, and 60 feet width and 8 feet depth above this for a distance of about 2,600 feet.

Five-mile River is in the Fairfield collection district and is about 13 miles west of Bridgeport, the port of entry. The nearest light-house is on Sheffield Island, nearly 2 miles from the mouth of the harbor. The nearest work of defense is Fort Schuyler, at the head of Long Island Sound, 27 miles southwest.

Money statement.

July 1, 1899, balance unexpended	$2,523.41
June 30, 1900, amount expended during fiscal year	2,465.00
July 1, 1900, balance unexpended	58.41
Amount (estimated) required for completion of existing project	22,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	5,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations for improving harbor at Five-mile River, Connecticut, have been made as follows:

Application.	Date.	Amount.
Dredging	Aug. 11, 1888	$5,000
Do	Sept. 19, 1890	5,000
Do	July 13, 1892	5,000
Do	Aug. 18, 1894	2,500
Do	June 3, 1896	2,500
Do	Mar. 3, 1899	2,500
Total		22,500

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

These statistics have been asked for, but have not been received. The last report received was for 1897, as follows:

Arrivals and departures of vessels.

FIVE-MILE RIVER HARBOR.

[Draft, 3 to 8 feet; tonnage, 40 to 104 gross tons.]

Kind of vessel.	Number of round trips.
Steamers (including oyster steamers)	1,000
Sailing vessels	[a]7,500
Barges	6
Total	8,506

[a] Includes the numerous trips made by about 40 small oyster boats.

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Receipts:		
Coal	1,500	$6,000
Oysters	7,180	149,167
Miscellaneous (not otherwise included)	300	1,500
Total receipts	8,980	156,667
Shipments:		
Oysters, produce, etc., of which 2,000 tons were oysters for shipment to Europe	2,000	54,167
Other transactions in oysters and clams, sales to dealers, planters, and consumers, about	5,180	95,000
Oyster shells	1,000	3,080
Total shipments	8,180	152,247

The above figures show an increase of 5,862 tons over the last report received, that of 1895.

No new lines of transportation established since January 1, 1897.

All of the above figures are estimates based upon the best information obtainable.

E 14.

IMPROVEMENT OF STAMFORD HARBOR, CONNECTICUT.

The approved project for this harbor consists in dredging to make channels in the East and West branches. That in the West Branch is to be about 1⅛ miles long, 150 feet wide, and 7 feet deep at mean low water, with a basin between harbor lines at its head, and the one in the East Branch to be 100 feet wide and 9 feet deep at mean low water for a length of 8,535 feet, and thence to the head of the harbor about 1,200 feet with same depth and width of 50 feet; all at a total estimated cost of $123,500.

Under the appropriation of $6,000 in act of March 3, 1899, a contract for dredging was made June 13, 1899, with the Hartford Dredging Co., at 16 cents per yard for work done within four months after notification to begin work, and at 8 cents after that period. Work was begun July 6 and finished November 16. The total amount dredged was 29,238 yards, 2,672 yards of which was dredged after the expiration of the four months' period, and was paid for at 8 cents per yard. In the West Branch 7,524 yards were dredged, extending a channel 60 feet wide and 7 feet deep to the harbor line at the north end. In the East Branch the work consisted chiefly in dredging the channel to project depth above the steamboat dock, including a turning basin at the upper end.

Stamford Harbor is in the Fairfield collection district, of which Bridgeport is the port of entry. There is a light-house on the middle-ground at the harbor entrance. The nearest work of defense is Fort Schuyler, Throgs Neck, 20 miles to the southwest.

Money statement.

July 1, 1899, balance unexpended	$6,562.68
June 30, 1900, amount expended during fiscal year	5,314.16
July 1, 1900, balance unexpended	1,248.52
July 1, 1900, outstanding liabilities	3.50
July 1, 1900, balance available	1,245.02
Amount (estimated) required for completion of existing project	82,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	12,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for improving Stamford Harbor, Connecticut, have been made as follows:

Application.	Date.	Amount.	
For previous projects:			
Dredging West Branch 5 feet deep	Aug. 5, 1886	$10,000	
Do	Aug. 11, 1888	5,000	
Do	Sept. 19, 1890	5,000	
			$20,000
For the present project:			
Dredging and rock removal, East Branch, $13,800; dredging West Branch, $1,200	July 13, 1892	15,000	
Dredging and rock removal, East Branch, $5,000; dredging West Branch, $5,000	Aug. 18, 1894	10,000	
Dredging West Branch	June 3, 1896	10,000	
Dredging	Mar. 3, 1899	6,000	
			41,000
Aggregate			61,000

Contract in force June 30, 1899, for dredging in Stamford Harbor, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract completed.
Hartford Dredging Co	June 13, 1899	June 22, 1899	July 6, 1899	Nov. 16, 1899

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through the courtesy of Mr. Charles H. Leeds, deputy collector of customs.]

Arrival and departure of vessels.

[Draft, 5 to 15 feet; tonnage, 20 to 550 tons.]

Kind of vessels.	Round trips.
Steamers	1,086
Sailing vessels	283
Barges	665
Total	2,034

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Coal	80,000	$400,000
Building materials	17,815	176,225
Miscellaneous	159,872	5,250,000
Total	257,687	5,826,225

The above figures show an increase of 5,504 tons of freight from that reported for 1898.

This report includes all the harbor of Stamford, east and west sides.

No new lines of transportation were established during the year.

E 15.

IMPROVEMENT OF HARBOR AT COSCOB AND MIANUS RIVER, CONNECTICUT.

The approved project for the harbor consists in dredging a channel 1¼ miles in length, 6 feet deep at mean low water, 150 feet wide, from the 6-foot curve in the harbor to the bridge, two-fifths mile, and thence 100 feet wide to the head, four-fifths mile, together with a turning basin near the lower end 300 by 1,750 feet, at an estimated cost of $54,000.

Under a small balance of the appropriation in act of June 3, 1896, proposals were invited for dredging in furtherance of the project, and a contract entered into with the lowest bidder, the Hartford Dredging Company, at 18 cents per yard. Operations began on the 26th of June and were completed July 7, 1899, 6,500 yards having been dredged. The result has been to extend the channel the project depth and a width of about 100 feet to a point about 1,600 feet above the railroad bridge, and a channel 5 feet deep and about 50 feet wide 180 feet farther, ending at the stone dock.

Coscob Harbor and Mianus River are in the collection district of Fairfield, Conn., of which Bridgeport is the port of entry. The nearest light-house is on Great Captains Island, about 2 miles southwest from the harbor entrance. Fort Schuyler, Throgs Neck, New York, 18 miles to the southwest, is the nearest work of defense.

Money statement.

July 1, 1899, balance unexpended	$1,545.19
June 30, 1900, amount expended during fiscal year	1,374.88
July 1, 1900, balance unexpended	170.31

Amount (estimated) required for completion of existing project	35,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	10,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for improving Coscob Harbor and Mianus River have been made as follows:

Application.	Date.	Amount.
Dredging below railway bridge	July 13, 1892	$7,000
Dredging above railway bridge	Aug. 18, 1894	4,000
Dredging turning basin and above railway bridge	June 3, 1896	8,000
Total		19,000

Contract in force June 30, 1899, for dredging in Coscob Harbor, Connecticut.

Name of contractor.	Date of contract.	Date of approval.	Work begun.	Contract completed.
Hartford Dredging Co	June 22, 1899	July 22, 1899	June 26, 1899	July 7, 1899

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899

[Through the courtesy of Mr. E. F. Lockwood.]

Arrivals and departures of vessels.

[Draft, 4 to 8 feet; tonnage, 25 to 100 tons.]

	Number of vessels.	Number of trips.	Aggregate tonnage of all trips.
Steamers	2	550	17,000
Sailing vessels	59	59	1,376
Barges	31	31	4,300
Total	92	640	22,676

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Receipts: Coal, timber, oysters, hardware, ship-building materials, and general merchandise	6,960	$117,800
Shipments: Ice, car sweepers, oysters, fish, and farm produce	2,400	31,000
Total	9,360	148,800

The above figures show a decrease in tonnage of 15,640 tons from the report for 1898.

No new lines of transportation have been established during the year.

The dredging that has already been done near the mouth of the river makes the Mianus River one of the finest harbors along the sound, suitable both for large vessels or yachts, but in order to benefit the people inland it would be necessary to continue the dredging to the head of the harbor. There is no regular packet plying between here and New York, which makes the increased cartage quite an item to the factories, groceries, etc. There were no shipments from the farmers for lack of transportation, which formerly amounted to several thousand barrels of apples, potatoes, and a great many tons of hay and straw.

E 16.

IMPROVEMENT OF GREENWICH HARBOR, CONNECTICUT.

The approved project for this harbor is to dredge a channel 90 feet wide from the mouth of the harbor to a causeway at its head, to be 9 feet deep at mean low water to the lower docks, a distance of half a mile, and 6 feet deep above, a distance of half a mile; the upper end is to be slightly enlarged, to form a turning basin; all at an estimated cost of $20,000.

No work was done on this improvement during the fiscal year, from lack of sufficient funds.

Greenwich Harbor is in the collection district of Fairfield, Conn., of which Bridgeport is the port of entry. The nearest light-house is on Great Captains Island, about 2 miles southward. The nearest work of defense is Fort Schuyler, Throgs Neck, New York, about 16 miles to the southwest.

Money statement.

July 1, 1899, balance unexpended	$878.15
July 1, 1900, balance unexpended	878.15
Amount (estimated) required for completion of existing project	14,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	14,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

The only appropriation for improving Greenwich Harbor, Connecticut, is the one of $6,000 made by the river and harbor act of June 3, 1896.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

These statistics have been asked for, but have not been received. The last report received was for 1897, as follows:

Arrivals and departures of vessels.

[Draft, 3 to 14 feet; tonnage, 40 to 750 tons.]

Kind of vessel.	Number of round trips.
Steamer Maid of Kent, passenger and freight line	Daily trips.
Sailing vessels, schooners, brigs, and sloops	Do.
Steam barges, steam canal boats, and steam lighters	Weekly trips.
Coal barges (in tow of tugs)	Two and three each week.

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Coal	25,000	$125,000
Lumber, 15,000,000 feet	15,000	2,500,000
Brick, 12,000,000	24,000	75,000
Gravel, 80,000 cubic yards	35,000	45,000
Trap rock, 80,000 cubic yards		
Crushed stone, 80,000 cubic yards		
Lime, 60,000 barrels	9,000	75,000
Cement, 60,000 barrels		
Plaster, 60,000 barrels		
Wall plaster and mortar in bags	2,500	15,000
Grain 500,000 bags	2,500	450,000
Quarried stone, 7,500 cubic yards	13,000	22,500
Miscellaneous, tile pipe, iron pipe, bluestone flagging, etc	5,000	125,000
General freight by propeller Maid of Kent (150 tons each trip)	45,000	2,000,000
Total	176,000	5,432,500

The above figures show an increase of 66,500 tons over the report for 1894, which was the only one received heretofore.

E 17.

SURVEY AND ESTIMATE OF COST OF IMPROVEMENT OF HARBOR OF NEW LONDON, CONNECTICUT, TO MEET THE DEMANDS OF COMMERCE AT THAT PORT.

[Printed in House Doc. No. 392, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, February 2, 1900.

Sir: The river and harbor act of March 3, 1899, appropriates $20,000 for improving Thames River, Connecticut, and provides that out of this appropriation the Secretary of War is directed to cause a survey and estimate of the cost of improvement to be made, with a view to improving the harbor at New London, Conn., to meet the demands of commerce at that port; and I have the honor to submit herewith a report upon the subject dated January 27, 1900, with map,[1] by Maj. Smith S. Leach, Corps of Engineers.

New London Harbor has been improved to a small extent by the United States, for the benefit of the local commerce, and work is now in progress in that portion of the harbor known as Shaws Cove, with a view to improving it as a winter harbor and anchorage; but as a refuge the harbor meets all demands in its natural condition, and its improvement must be considered solely in the interest of the commerce of the port of New London.

In the opinion of the representatives of the marine interests, a depth of from 22 to 25 feet at mean low water is required, and the plan of improvement presented by Major Leach contemplates the creation and maintenance, by dredging, of a channel having a depth of 23 feet at mean low water and a ruling width of 400 feet, extending from deep water, opposite Fort Trumbull, to the docks, and thence along the water front of the city, returning to deep water at the Central Vermont (New London Northern) Dock, as shown by the shaded area on the accompanying map. It is estimated that this work, including contingencies, will cost $145,000, and $1,000 annually for maintenance.

Major Leach considers the locality to be worthy of improvement by the United States, and his views are concurred in by the division engineer, Col. G. L. Gillespie, Corps of Engineers.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. SMITH S. LEACH, CORPS OF ENGINEERS.

United States Engineer Office,
New London, Conn., January 27, 1900.

General: I have the honor to submit herewith a report upon a survey "made with a view to improving the harbor at New London, Conn., to meet the demands of commerce at that port," with an "estimate of the cost of improvement," as provided for in the clause of the river and harbor act approved March 3, 1899, making an appropriation for improving Thames River.

The field work of the survey consisted of a traverse of the shore line, embodying changes along the dock frontage; careful levelings to connect the bench marks formerly used in referencing tidal planes; and soundings made on cross-section lines, the lines themselves, and the soundings in the lines, spaced according to the character and shape of the bottom, with the object of developing reliable contours with the least expenditure of labor.

The recorded bench marks at Fort Trumbull, Central Vermont Dock, and the navy-yard were found to be discrepant in a degree which could not be reconciled without attributing contradictory and wholly improbable inclinations to the water surfaces. An automatic tide gauge was established at the navy-yard in connection with construction work there, and the reduced results were courteously supplied by Mr. A. C. Lewerenz, civil engineer, United States Navy. His determination of mean low water from the automatic record of 354 consecutive low tides was adopted as the plane of reference. The variation from this plane of the recorded elevations of the three bench marks named is:

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[1] Not reprinted. Printed in House Doc. No. 392, Fifty-sixth Congress, first session.

	Foot.
Fort Trumbull	+0.63
Central Vermont Dock	— .764
Navy-yard	— .234

The mean low water as determined by the gauge readings taken while the hydrography was in progress differs from this plane as follows:

	Foot.
Fort Trumbull	+0.215
Central Vermont Dock	+ .166
Navy-yard	+ .066

It seems certain that the bench marks are in error. The Fort Trumbull bench seems to have risen, which is not reasonable, and this error is probably one of identification. The other benches appear to have settled, and have probably done so.

The soundings were taken with lead and chain from a rowboat, and with the greatest care. The chain was graduated to feet by metal and leather tags. The fractions of feet were estimated to the nearest quarter. The boat was kept on the range by targets on shore for part of the work and by a transit for the rest, and in all cases the position of the leadsman was determined at every sounding by a transit intersection.

GENERAL DESCRIPTION.

The harbor of New London, Conn., is that part of Thames River below the bridge of the New York, New Haven and Hartford Railroad, about 3½ miles in length. The east bank is fairly straight, and ranges with the bank of the river above. The west side presents a series of coves with intervening points of land, the effect of which is to considerably increase the average distance between the banks. The main river channel flows along the east side with normal width and with depths of 30 to 50 feet. The wharves of New London are on the west bank, and are separated from the deep channel by a broad shoal of soft mud and sand. The greatest depth that can now be carried to the principal wharves is 15 feet at mean low water, and this only by a narrow, tortuous, and difficult channel. As a matter of fact the vessels of greatest draft are loaded to more than 15 feet, so that they can approach the docks at high water only.

This harbor is much sought as a refuge in rough weather. It is sheltered from wind, and by its good holding ground, range of depths, and moderate currents offers a safe and convenient anchorage for vessels of every class. As a refuge it meets all demands in its natural condition. Its improvement must be considered as solely in the interest of the commerce of the port of New London.

The mean range of tides is 2½ feet.

Harbor lines were established in a part of the harbor known as "Shaws Cove" in 1893. A harbor line along the main frontage of the port has been provisionally approved by the Secretary of War, and the final map is now in preparation.

The harbor is in the collection district of New London. The nearest works of defense are Fort Trumbull and Fort Griswold, the former on the west and the latter on the east side of the harbor. The nearest light is at the mouth of the harbor, on the west side.

COMMERCE OF NEW LONDON.

New London is the port of entry of the collection district of the same name. Its population is about 20,000, devoted to general merchandising and manufacturing. It is the tide-water terminus of the Central Vermont, Norwich and Worcester, and Northern Central railroads, the former now controlled by the Grand Trunk and the two latter by the New York, New Haven and Hartford. Two lines of steamers ply between New London and New York City, connecting with these roads—the Norwich Line of daily boats for passengers and freight and the Central Vermont Line of daily boats for freight only. There are also a steamboat plying between Norwich and New York, touching at New London; an excursion boat during the summer season from Norwich to Block Island, touching at New London and Watch Hill; two boats for passengers and freight, one of them carrying mails, between New London and Long Island, one all the year round and the other in summer only; and a daily boat between New London and Fishers Island. There are other excursion boats in the summer season, but they are small and need not be more definitely scheduled. The newly established Colonial Line of steamers, plying between Halifax and West Indian ports, has selected New London as its United States port.

The statistics of the port, as collected for this report, show a total volume of water-borne commerce of 550,000 tons for the calendar year 1899. The distribution as to commodities and amounts is shown in an appended table.

PREVIOUS IMPROVEMENTS BY THE UNITED STATES.

The foregoing marine interests and commerce relate to the harbor of New London, as distinguished from the Thames River, which has been the main object of appropriations. Of the considerable sums expended in the improvement of the river a very large percentage have not appreciably benefited these interests.

Improvement of New London Harbor proper began in 1880 by the application of $2,500 allotted by Congress from the appropriation of that year for Thames River. The work undertaken was dredging an approach to the east side of the New London Northern Railway Wharf, and it was continued under specific appropriations until 1886, when $19,800 had been appropriated and expended. The improvement was useful, but local.

Under permissive provisos in the acts of 1892, 1894, and 1899 the section of New London Harbor known as "Shaws Cove" has been dredged to 12 feet at mean low water as a winter harbor and anchorage. The expenditures have aggregated about $19,000, and under a contract now pending the work will be completed at a total cost of $21,000. These two detached undertakings constitute the sum total of improvements of New London Harbor by the United States.

EXTENT OF IMPROVEMENT DESIRED.

The views of representatives of marine interests who have been consulted range from 22 to 25 feet at mean low water as the proper depth to be adopted in the formulation of a new project. The present vessels of the Colonial Line draw 22 feet loaded, and if others are added they will probably draw more rather than less. The boats of the Central Vermont Line draw 19 feet, but the representatives of that line state that there is a probability of their bringing vessels drawing 23 feet, if depth is provided for their accommodation. Representatives of the coal interest state that vessels drawing 22 to 24 feet are frequently offered them at very favorable rates, but they can not accept any vessel drawing over 19 feet for the Central Vermont Dock or 18 feet for other parts of the harbor. In the latter case the vessels can be berthed only at extreme high tide. On behalf of the towing interests it is urged that at the principal ports between New London and Cape Cod—New Bedford, Fall River, and Providence, for example—the coal docks and their approaches have 23 feet at low water, and that if the same depth were available here the towing business would be greatly benefited.

A representative of the lumber interests states that premiums are now demanded by light-draft vessels in that trade, and that the certainty of supply is interfered with by the necessity of making a selection among the vessels offered for charter.

A consideration affecting the low-water depth to be adopted is the low tidal range of the port—2½ feet. The maximum draft available at high water is important, as vessels of that draft, while subject to some delays, are not wholly excluded. The high-water draft, a very good index of the value of the port, is, of course, the low-water draft plus the tidal oscillation, and if the latter be unusually small it affords one very good reason why the former should be made as great as possible.

PLAN PROPOSED AND ESTIMATE OF ITS COST.

It is proposed to create and maintain by dredging a side channel, shown in plan on the map, 23 feet deep at mean low water. The channel leaves the deep water of the river opposite Fort Trumbull, skirts the water front of the city, and returns to the deep water at the Central Vermont Dock. Vessels of large size can enter this channel at either end and leave at the other without being obliged to turn. The channel proposed has a ruling width of 400 feet.

Explorations of the bottom at points noted on the map indicate that nothing but soft material will be encountered, except over a very small area east of the Central Vermont Dock, where the material is of more difficult character. There is not much of this, however, and it is in a locality which permits of its being omitted without serious prejudice to the project. The dumping ground is less than 4 miles distant. So a relatively low price may be expected. A total of 1,600,000 cubic yards of material must be removed to complete the proposed channel, which is estimated to cost $145,000, including all contingencies.

The annual maintenance will be relatively small, as excavations previously made in the same locality have shown reasonable permanence. An estimate of $1,000 per annum for maintenance is submitted, but it should be considered subject to revision, as it rests upon insufficient data.

I have the honor to state that, in my opinion, the harbor of New London is worthy of improvement by the General Government to the extent above described.

Very respectfully, your obedient servant,

SMITH S. LEACH,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

(First indorsement.)

NORTHEAST DIVISION ENGINEER OFFICE,
New York, January 29, 1900.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

Tabular statement of the commerce of the port of New London for the calendar year 1899.

	Tons.
General merchandise	444,070
Coal	65,228
Lumber	31,650
Machinery	1,000
Building materials	2,000
Cement	1,560
Brick	4,600
Total	550,108

E 18.

EXAMINATION AND PLAN AND ESTIMATE FOR IMPROVEMENT OF MILFORD HARBOR, CONNECTICUT.

[Printed in House Doc. No. 280, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, January 9, 1900.

SIR: I have the honor to submit herewith copies of reports dated May 8 and December 28, 1899, with map[1], by Maj. Smith S. Leach, Corps of Engineers, upon preliminary examination and survey, respectively, of Milford Harbor (Wepauwog River), Connecticut, made in pursuance of requirements of the river and harbor act of March 3, 1899.

Major Leach presents a plan for improvement of Milford Harbor by the creation and maintenance, by dredging, of a channel across the bar and through the lower harbor, extending up to Merwin's wharf, 100 feet wide and 10 feet deep at mean low water, with an anchorage basin of the same depth of about 6 acres area on the east side of the channel between the long dike and the harbor line; also a channel through the upper harbor, from Merwin's wharf to the straw-works wharf, 90 feet wide and 6 feet deep at mean low water; the entire work estimated to cost, including contingencies, $15,000, and $500 annually for maintenance.

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[1] Not reprinted. Printed in House Doc. No. 280, Fifty-sixth Congress, first session.

In the opinion of Major Leach the locality is worthy of improvement to the extent proposed, and his views are concurred in by the Division Engineer, Col. G. L. Gillespie, Corps of Engineers.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF MILFORD HARBOR, CONNECTICUT.

UNITED STATES ENGINEER OFFICE,
New London, Conn., May 8, 1899.

GENERAL: As directed in Department letter of March 15, I have the honor to submit herewith report of preliminary examination of Milford Harbor, Connecticut. I have not visited the harbor since the receipt of the communication cited from lack of opportunity to do so, but I do not consider a visit essential to the proper performance of my duty in the matter of this report, inasmuch as I have visited the harbor within the last two years in company with gentlemen interested in its improvement, and obtained then personal information upon which this report is in part based.

Milford Harbor has heretofore been the object of improvement by the United States. The last report upon the harbor is found in the Report of the Chief of Engineers for 1894, Part I, page 650. Appropriations aggregating $47,100 were made from 1872 to 1890, and were expended for a survey, for building jetties and shore protection, and for dredging. The condition of the improvement when work closed is stated in the Report of the Chief of Engineers cited, at page 653. At that time the project was reported completed, and it was stated that nothing further was contemplated, except "what is from time to time necessary for the maintenance of the jetties and dredged channels."

The project as then completed included spurs for shore protection to prevent the wasting of Welchs Point; a long jetty to control the flow of currents, built out from the south side of the mouth of Indian Harbor, and a detached jetty parallel to the entrance channel off Burns Point. In addition to these permanent works a channel 8 feet deep and over 100 feet wide had been dredged through the bar at the mouth of the river, and a channel 4 feet deep at mean low water had been dredged from the mouth of the river to the upper limit of the harbor at the straw-works wharf, with width of 60 feet for about two-thirds of its length and 40 feet for the remaining third. The mean rise of tide in the harbor is 6 feet.

The present condition of the harbor can not be known without some additional data, except, in the general sense, that the above-described channels have considerably deteriorated in dimensions, and the jetties certainly, and possibly the shore protection, have suffered some injury. The commerce, consisting principally of oysters and coal, was reported at 9,800 tons, valued at $137,000, in 1893. No later reports have been obtained, but it is known that this commerce has considerably increased in the interim.

I am of the opinion that Milford Harbor is worthy of improvement by the General Government, certainly to the extent of restoring the channel dimensions of the former project, and possibly of somewhat increasing them. The precise measure of improvement to be undertaken and its probable cost can not be stated without further inquiry. A survey in the ordinary sense is not required, as the data now on hand and available, carefully collated and supplemented by information which can be obtained without cost, will enable a map to be drawn and an estimate made.

Very respectfully, your obedient servant,

Smith S. Leach,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Though the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, May 13, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer. The last map of harbor appears in Annual Report Chief of Engineers, 1886, Part I, page 640, to which reference is respectfully invited.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

Office Chief of Engineers,
U. S. Army,
July 1, 1899.

Respectfully submitted to the Secretary of War.

This is a report upon preliminary examination of Milford Harbor, Connecticut, made to comply with the provisions of the river and harbor act of March 3, 1899.

It is the opinion of Major Leach, concurred in by the division engineer and myself, that the harbor is worthy of improvement by the General Government. A survey in the ordinary sense is not required, and I recommend that the local officer be directed to submit a plan and estimate of cost of proposed improvement, the preparation of which can be effected without cost to the Government.

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Third indorsement.]

WAR DEPARTMENT,
July 8, 1899.

Approved as recommended by the Chief of Engineers, United States Army.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

PLAN AND ESTIMATE OF COST OF IMPROVING MILFORD HARBOR, CONNECTICUT.

UNITED STATES ENGINEER OFFICE,
New London, Conn., December 28, 1899.

GENERAL: Pursuant to instructions contained in Department letter of July 11, 1899, I have the honor to submit herewith a plan and estimate for the improvement of Milford Harbor, Connecticut.

Milford Harbor is on the north shore of Long Island Sound, about 9 miles southwest of New Haven, Conn. Between Welchs Point on the east and Charles Island on the west is a broad bay, free of obstructions but relatively shallow, open to the south and sheltered from other directions. Into the bight of this bay flow two small tidal streams—the Wepauwog River, extending three-fourths of a mile northward, and the Indian River, a broader stream, with marshy ramifications, having a tidal capacity apparently greater than the Wepauwog.

The mouth of Indian River has been partially closed by a dam to facilitate the operation of a tide mill in the gap. This river is not further considered in this report, except as to the influence of its outflow on the channel of the Wepauwog. The latter stream will be hereafter referred to as the harbor of Milford, distinguishing the parts above and below Merwin's Wharf as the "upper" and "lower" harbors, respectively. The mean tidal oscillation is reported to be 6.3 feet. Harbor lines were approved by the Secretary of War under date of September 6, 1896, and are shown on the map.

The harbor is in the collection district of New Haven. The nearest work of defense is Fort Schuyler, 45 miles southwest. The nearest light is at Stratford Point, 4 miles southwest.

Originally the depth on the bar at the mouth of the harbor was less than 2 feet at mean low water, and in parts of the upper harbor the channel ran nearly bare. Under a project for improvement adopted in 1872, a channel 100 feet wide and 4 feet deep at mean low water was excavated through the bar, and in the upper harbor, of the same depth, 60 feet wide from Merwin's Wharf to Town Dock and 40 feet wide thence to the straw-works wharf at the head of the harbor. A series of spur dikes were built to protect Welchs Point from erosion. There were also built two jetties or dikes to maintain the bar channel, one projecting from the shore outside the mouth of Indian River, and the other off Burns Point, detached from shore nearly at right angles to the first, and about 300 feet from its western or outer end. This interval of 300 feet between the end of one dike and the face of the other is designed to localize the ebb and flow of tide and increase its scouring action.

A revised project adopted in 1881 provided for an increase in the depth of the bar channel from 4 to 8 feet at mean low water, the width remaining at 100 feet. In 1891 this project was reported completed, with the dikes and bar channel in good condition and the channel in the upper harbor somewhat deteriorated. The following is a summary of the appropriations made and expended for these projects, and their application:

Application.	Date.	Amount.
Survey	June 10, 1872	$1,500
Jetties on east shore	June 23, 1874	5,000
Long jetty and dredging at mouth of river	Mar. 3, 1875	13,000
Dredging to town wharf	June 18, 1878	10,000
Dredging above town wharf and (8 feet) below Merwin's Wharf on bar	June 14, 1880	5,000
Survey for breakwater	Mar. 3, 1881	100
Dredging 8 feet on bar	Aug. 2, 1882	5,000
Dredging 8 feet on bar and repairing long jetty	Aug. 11, 1888	5,000
Repairing jetties	Sept. 19, 1890	2,500
Total		47,100

No work has been done by the United States since 1891; but in 1894–95 permits were granted private parties to dredge in this vicinity for materials to be used in oyster culture, conditioned upon the work being done under the supervision of the local engineer and directed to the betterment of navigation. Not more than 85,000 yards were taken out under these permits, and possibly not so much, but a large quantity was removed. It was taken almost wholly from the bar channel; and a statement is on file that when the last dredging was completed, in July, 1895, there was a clear channel across the bar 12 feet deep at mean low water and nowhere less than 80 feet wide.

From the best data obtainable the condition of the dredged channels may be summarized as follows for the epoch July 1, 1895:

First. The bar channel 12 feet deep at mean low water and 80 feet wide and upward.

Second. The lower harbor 9 feet deep at mean low water, with a width approximately of 100 feet.

Third. The upper harbor slightly less than 4 feet deep at mean low water, 60 feet wide to town wharf, and 40 feet wide above.

At the present time the conditions are as shown on the map, and may be stated as follows:

First. A bar channel presenting a ruling depth of 11 feet at mean low water, but showing distinct traces of the original 12-foot depth and with a decided shoal of very soft material near the inner extremity.

Second. In the lower harbor a ruling depth but little less than 9 feet and still showing some 9-foot contours.

Third. In the upper harbor a channel varying from 6 feet at mean low water at the lower end to 3½ and 4 feet at town wharf and 2½ feet above.

A comparison of these two conditions at four and one-half years' time interval gives an idea of the rate of deterioration of dredged channels in this harbor—a prime factor in estimating the feasibility and cost of improvement. As a result of such comparison it appears that there is under present conditions a rapidly forming shoal of small area and soft material near the inner end of the bar channel. This will require removal, perhaps, biennially. Aside from this the bar channel generally and the lower harbor have deteriorated less than 3 inches per annum in depth since 1895, a condition which may be characterized as distinctly stable.

The present condition of the channel in the upper harbor may, with much probability, be attributed to a cause not connected with sedimentation. A narrow cut with high margins in soft material will shoal more or less by the breaking down of the banks left steeper than they can permanently stand, and the flow of the material over the bottom. Such action should increase with the narrowness of the cut and the height of the banks. In the lower part of the channel of the upper harbor, where the cut was 60 feet wide and the banks very low, the project depth yet remains, and this depth deteriorates progressively upstream as the height of bank increases, with a sudden change at the point where the width is reduced to 40 feet. It seems probable that there has not been much change due to sedimentation, and that if the channel were made wider in proportion to the depth it would be as stable as the lower harbor.

Statistics of the commerce of the port for 1898 and 1899, courteously supplied by Capt. C. R. Akin, are appended. These indicate a total freight movement of about 12,000 tons per annum of actual waterborne commerce, and an additional prospective movement of about 6,000 tons, now carried by rail because the depth of water in the harbor is insufficient. That there has been no apparent increase in tonnage since 1891 is due to the fact that in that year the output of the fertilizing works on Welchs Point was included in the commerce of Milford Harbor. These works have been discontinued. It is stated that building materials and other commodities would arrive by water if the depth sufficed for the vessels that carry them.

The present and prospective traffic of the upper harbor, while of sufficient importance to demand consideration, is not of a volume or character to be seriously inconvenienced by the loss of a tide. Hence a low-water navigation is not demanded for this port. A depth of 6 feet at mean low water would insure a depth of 10 feet at the lowest high tides and would meet the present needs of commerce. The channel should be made 90 feet wide to realize a permanent width of 75 feet. For the lower harbor and bar channel the oyster industry dominates the situation. During the active season more than 14 oyster steamers work from Milford Harbor on adjacent grounds. They draw from 6 feet to 8 feet, and to do their work must be able to go out at a certain hour in the morning and return at a certain hour in the evening, regardless of tides. Hence a low-water navigation is demanded here, and a depth of 10 feet at mean low water is necessary to guarantee 8 feet at the lowest low tides. Except as to the increase of width in the upper channel the trace of the former project seems a proper one to adopt, with the addition of an anchorage basin at the mouth of Indian River. Such a basin is required not only for the oyster boats, but for schooners of 200 tons or less, which frequently take refuge here in heavy weather. One such anchored in the present channel seriously obstructs it. The depth of the anchorage should be the same as the adjacent channel, and its area approximately as indicated on the map.

To meet the foregoing conditions and requirements, the following project for the improvement and maintenance of Milford Harbor, Connecticut, is submitted:

A channel, to be created and maintained by dredging across the bar and through the lower harbor, 100 feet wide and 10 feet deep at mean low water, with an anchorage basin of the same depth of about six acres area on the east side of the channel between the long dike and the harbor line. A channel through the upper harbor from Merwin's wharf to the straw works wharf, 90 feet wide and 6 feet deep at mean low water.

To create these channels and anchorage will involve 90,000 cubic yards of dredging, estimated to cost, including inspection, administration, and all contingencies, $15,000.

To maintain the project dimensions will probably require biennial dredging to an amount of 5,000 cubic yards, estimated to cost $1,000, making the estimate for maintenance of the project $500 per annum.

In the degree above suggested, the harbor of Milford, Conn., is, in my opinion, worthy of improvement by the General Government.

Very respectfully, your obedient servant,

SMITH S. LEACH,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, December 29, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

Statistics of the commerce of Milford Harbor for the calendar years 1898 and 1899.

[Furnished by Capt. C. R. Akin, of Milford, Conn.]

	Number.	Average tonnage.
Steamers arriving	1,420	12 to 179
Schooners arriving	40	28 to 78
Sloops arriving	106	9 to 34
Barges arriving	4	127 to 233
Pleasure boats (estimated)	150	....

Received at Merwin's wharf:		Tons.
Seed oysters	98,000 bushels	3,300
Large oysters for culling	10,400 bushels	
Coal		600
Water pipe		800
Total		4,700

Estimated value, $43,800.

LOWER HARBOR.

Shipped from Merwin's wharf:

Seed oysters, 2,975 tons, estimated at	$390,500

Business of upper harbor for 1897–98 not reported.

1898–99.

	Number.	Tonnage.	Draft (feet).
Steamers	907	12 to 129	3 to 11½
Schooners	45	28 to 190	5 to 12
Sloops	17	9 to 28	4½ to 6
Barges	6	127 to 223	8 to 10

LOWER HARBOR.

	Tons.	Value.
Received:		
Oysters	2,320	$39,400
Oyster shells	2,000	9,000
Coal	500	1,500
Total	4,820	49,900
Shipped:		
Oysters	2,000	39,600
Shells	2,600	11,250
Total	4,600	50,850

UPPER HARBOR.

Coal	2,345	7,085

In addition to the above, coal, ashes, manure, iron pipe, and other commodities, aggregating 6,000 tons, were received by rail, which would have arrived by water if depth had been sufficient.

E 19.

HARBOR LINES IN THAMES RIVER AT NEW LONDON, CONNECTICUT.

United States Engineer Office,
New London, Conn., April 2, 1900.

General: Referring to Department letter of July 26, 1899, I have the honor to transmit herewith tracing[1] of a final harbor-line map of the harbor lines for the portion of New London Harbor approved by the Secretary of war under date of July 22, 1899,[2] together with a description of the line by metes and bounds. The line has been thoroughly and carefully marked, and the principal monuments thoroughly referenced, so that there should be no difficulty in locating this line definitely at any time hereafter.

Very respectfully, your obedient servant,

Smith S. Leach,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

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[1] Not printed.

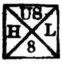
[2] See Annual Report Chief of Engineers, 1899, p. 1189.

DESCRIPTION BY METES AND BOUNDS OF HARBOR LINES OF NEW LONDON HARBOR, CONN., ESTABLISHED IN 1899.

In the following description all bearings are referred to the true meridian. The capital letters are used to designate the intersection points of the several sections of the harbor line, as shown on a map which accompanies this description. The lengths of the several sections of the harbor line are taken by scale from the accompanying map, except the length of section No. 1, which is specifically noted on the approved map of these harbor lines.

Section No. 1 (H G).—Beginning at the northeast corner, H, of the north pier of the New York, New Haven and Hartford Railroad bridge at Shaws Cove, section No. 1 extends N. 40° 11′ E., 40 feet to an intersection, G, with section No. 2.

Section No. 2 (G F).—Beginning at the above intersection, G, with section No. 1, section No. 2 extends N. 74° 39′ 45″ E., 314 feet (±) to an intersection, F, with section No. 3.

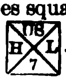
Section No. 2 is referenced by four points established on its westerly extension: The first is a drill hole in center of cross mark (+) in west wing of north pier of drawbridge at Shaws Cove; the second is a granite monument 6 inches square at top, set in the yard of W. H. Burdick, 21 Howard street, which monument is marked thus ; the third and fourth points are drill holes in the east and west curbstones, respectively, of Howard street.

From a line from the fourth point, in west curbstone, to the apex of the Groton monument, deflect 5° 54′ to the right to obtain the direction of section No. 2.

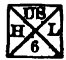
Section No. 3 (F E).—Beginning at the above-mentioned intersection, F, with section No. 2, section No. 3 extends N. 57° 05′ E., 1,378 feet (±), to an intersection, E, with section No. 4.

Section No. 3 is referenced by four points on its westerly extension and one point on its easterly extension.

The first point on westerly extension is an iron bolt driven in the ground just south of south pier of drawbridge at Shaws Cove, and nearly on line of west truss of same; this point being perishable can be reestablished by the intersection of two arcs, the first being drawn with a radius of 7.22 feet around a drill hole in center of cross mark (+) cut in segmentary capstone and about on line of west face of west truss of bridge; and the second being drawn with a radius of 29.14 feet around a drill hole in center of cross mark (+) cut in segmentary capstone and about on line of east truss of bridge. From a line from this first point on westerly extension of section No. 3 to the Groton monument, deflect 9° 14′ to the left to obtain the direction of section No. 3.

The second point on westerly extension of section No. 3 is a granite monument 6 inches square at top, set in the yard of J. A. Dayton, 35 Howard street, and marked thus . From a line from this monument to the Groton monument, deflect 8° 00′ to the left to obtain the direction of section No. 3.

The third and fourth points on westerly extension of section No. 3 are drill holes in east and west curbstones, respectively, of Howard street, the former being 39′ and the latter 48.5′ south of the extended south side of Dayton's house.

The point on the easterly extension of section No. 3 is a granite monument 6 inches square at top, marked thus , and set in Groton on east side of Thames street, 4.2 feet west of fence line and 61.5 feet north of the extended north line of Latham street.

From a line from this monument to the cross on the parish building of the First Congregational Church, New London, deflect 35° 27′ to the left to obtain the direction of section No. 3.

Section No. 4 (E D).—Beginning at the above-mentioned intersection, E, with section No. 3, section No. 4 extends N. 8° 18′ 55″ E., 752.5 feet (±), to an intersection, D, with section No. 5.

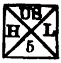
Section No. 4 is referenced by one point on its southerly and one point on its northerly extension. The point on the southerly extension is a drill hole in center of cross mark (+) cut in ledge rock at Fort Trumbull. From a line from this point to the First Congregational Church deflect 25° 07′ to the right to obtain the direction of section No. 4.

To locate the above point sight on line from center of most northerly gun platform to the First Congregational Church, deflect 15° 26′ left, and measure on this line 90.6 feet.

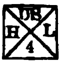
The point on the northerly extension of section No. 4 is a drill hole in center of circle and cross mark (—⊕—) cut in stone coping of bulkhead inclosing the New London Northern R. R. wharf on east side of Winthrops Cove. The above point is on south face of said wharf and about 162.5 feet from SE. corner of same. From a line from this point to the First Congregational Church deflect 63° 59′ to the left to obtain the direction of section No. 4.

This point may be reestablished by the intersection of two lines, namely, from inside strap bolt on west face of wharf, surrounded by circle cut in stone coping, and about 8 feet south of offset in said wharf, sight on line to First Congregational Church and deflect to the left 112° 29′ for first line of intersection; from inside strap bolt on east face of wharf surrounded by circle cut in stone coping and about 106.5 feet from SE. corner of wharf, sight on line to First Congregational Church and deflect 41° 14′ to the left for second line of intersection.

Section No. 5 (D C).—Beginning at the above-mentioned intersection, D, with section No. 4, section No. 5 extends N. 16° 59′ 40″ W. 1,027.5 feet (±) to an intersection, C, with section No. 6.

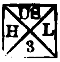
Section No. 5 is referenced by two points on its northerly extension. The first point is a granite monument 6 inches square at top, marked thus . It is situated near north end of west side of New London Northern R. R. Co.'s wharf on east side of Winthrops Cove. From a line from this monument to First Congregational Church deflect 49° 41′ to the left to obtain the direction of section No. 5.

Monument No. 5 is referenced by a point, namely, drill hole in center of circle and cross mark (—⊕—) cut in top stone of wing wall at north extremity of west face of above-mentioned wharf. From this point sight on line to First Congregational Church, deflect 95° 51′ right and measure 83.64 feet to monument No. 5.

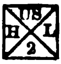
The second point on northerly extension of section No. 5 is a granite monument 6 inches square at top, marked thus . It is situated on north edge of Sixteenth street, and 195.81 feet distant from monument No. 5.

From a line from monument No. 4 to First Congregational Church deflect 45° 10′ 30″ to the left to obtain the direction of section No. 5.

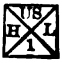
Section No. 6 (C B).—Beginning at above-mentioned intersection, C, with section No. 5, section No. 6 extends N. 34° 38′ 10″ W. 500 feet (±), to an intersection, B, with section No. 7.

Section No. 6 is referenced by one point on its northerly extension, namely, a granite monument 6 inches square at top, marked thus , and situated near southerly corner of old paint shop of New London Northern R. R. Co. at Winthrops Cove.

From a line from this monument to the Groton monument deflect 35° 25′ 30″ to the right to obtain the direction of section No. 6.

Monument No. 3 is referenced by monument No. 2, which is a granite stone 6 inches square at top, marked thus , and is situated on easterly extension of northerly truss of Central Vermont drawbridge at Winthrops Cove and about 13 feet from end of same; monument No. 3 being on a line from monument No. 2 to Groton monument and 83 feet distant from former.

Section No. 7 (B A).—Beginning at the above-mentioned intersection, B, with section No. 6, section No. 7 extends N. 53° 42′ 30″ W., 676 feet (±) to a point, A, being the southeasterly corner of southwesterly pier of Central Vermont drawbridge at Winthrops Cove.

On account of the impracticability of referencing section No. 7, a line parallel with the same and 20 feet perpendicularly distant to the southwest of it was referenced by two points on the northwesterly extension of this line. The first point is about on the southwesterly extension of the southeasterly truss of the Central Vermont drawbridge, and about 16 feet from the end of the same. It is on the line from monument No. 1, which is a granite stone 6 inches square at top, marked thus  to monument No. 3, and 234.50 feet from the former.

Monument No. 1 is on the west side of Winthrops Cove, north of the bridge approach and near the northern boundary of a small lot owned by the New London Northern R. R. Co. The line from monument No. 1 to monument No. 3 forms, with the line from monument No. 1 to the Congregational Church in Groton, an angle of 28° 44′.

The second point on the extension of the 20-ft. parallel to section No. 7 is a drill hole in center of cross mark (+) cut in top stone of abutment forming the foundation of the New York, New Haven and Hartford roundhouse on west side of Winthrops Cove; the drill hole being near the angle formed by the third and fourth stalls south.

E 20.

MODIFICATION OF HARBOR LINES AT NEW HAVEN HARBOR, CONNECTICUT.

UNITED STATES ENGINEER OFFICE,
New London, Conn., April 24, 1900.

GENERAL: Pursuant to the instructions contained in Department letter of October 21, 1897, I have the honor to state that I have given full consideration to the subject of modification of harbor lines at New Haven, and to submit herewith a tracing[1] showing the harbor lines now recommended for adoption. The long delay in this matter has been caused by a dispute between the Board of Harbor Commissioners of the city of New Haven and the Board of Common Council of the same city, as to which body had jurisdiction of the subject, and which was empowered to give the assent of the city to the proposed lines, which assent I regarded as an important preliminary to their adoption. I obtained a complete list of the riparian owners interested, and have secured their assent in writing to the proposed modification of the line except as to the city of New Haven. The Board of Harbor Commissioners have formally approved this proposed line, and the Board of Common Council have dropped the matter without final action. So far as the city is concerned, the matter has been settled by the State legislature, which, acting at the instance of the Board of Harbor Commissioners, adopted, by an enactment at the January session of last year, a harbor line which is minutely described in the act, and which follows, in all respects, a line which I had previously proposed for adoption. This action of the legislature quiets any objection that the city of New Haven might make, in its quality of riparian proprietor, to the adoption of this line by the Federal Government. During negotiation I consulted representatives of the shipping interests having knowledge of the requirements from the maritime point of view. I did not deem it necessary to hold a public hearing inasmuch as two such hearings were held, one by the Board of Harbor Commissioners and one by the Board of Common Council, of which the public were duly notified, and at which all persons had an opportunity to appear.

In this connection I invite attention to the correspondence attending the application of the New Haven Steamboat Company for an extension of Heaton's wharf, for which a permit was granted by the Secretary of War under date of March 29, 1897, in connection with which, in an indorsement of March 30, 1897, the Secretary expressed the opinion that the harbor line should be extended to include wharves on either side of Heaton's. A line so drawn is shown in yellow on the tracing. Upon my suggestion that the principle announced by the Secretary might well be applied to the entire situation, the promulgation of this modification shown in yellow was held in abeyance and has never been made. The line now proposed has been laid down so as to embody the basis of the Secretary's views, which was that existing structures should be legalized; and, in addition, it embodies such conditions as it appears to me should be fulfilled by all harbor lines, such, for example, as the greatest possible simplicity, the use of straight lines wherever possible, and the location of angles at points where their physical determination and perpetuation is possible.

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[1] Not printed.

I believe the modification of the line now proposed meets the conditions of the problem fully and permanently, and I have the honor to recommend that this modified line be presented to the Secretary for his approval as a lawful harbor line in lieu of the corresponding portion of the line approved by the Secretary under date of November 17, 1894.

Very respectfully, your obedient servant,

Smith S. Leach,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division, Engineer Office,
New York, April 26, 1900.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

[Second indorsement.]

Office Chief of Engineers, U. S. Army,
May 1, 1900.

Respectfully submitted to the Secretary of War with recommendation that the modification of harbor lines at New Haven Harbor, Connecticut, as recommended by Major Leach and shown in red on the accompanying map, be approved, the new line to be in lieu of the portion of line within the limits indicated approved by the Secretary of War November 17, 1894.

The tracing has been prepared for signature of the Secretary of War.

A. Mackenzie,
Acting Chief of Engineers.

[Third indorsement.]

War Department, *May 5, 1900.*

Approved as recommended by the Acting Chief of Engineers.

Elihu Root,
Secretary of War.

E 21.

ESTABLISHMENT OF HARBOR LINES IN EAST BRANCH OF STAMFORD HARBOR, CONNECTICUT.

UNITED STATES ENGINEER OFFICE,
New London, Conn., May 6, 1899.

GENERAL: I have the honor to forward, herewith inclosed, a letter from Mr. Schuyler Merritt, for the Blachley Land Company and the Yale & Towne Manufacturing Company, both riparian proprietors on the east branch of Stamford Harbor near its upper end. In this communication Mr. Merritt suggests the advisability of increasing the width of the channel near the upper end of the East Branch by dredging away a portion of the east bank, the land so taken to be released to the United States free of cost by its present owners. Acting on my suggestion, Mr. Merritt subsequently procured a written instrument, signed by Leonard Blondel, representing himself as owner in fee, and Joseph D. Warren, representing himself as mortgagee of the land proposed to be released, by which instrument they engage to execute any necessary transfer or release of the land abutting the channel, "so that the United States shall be at no expense or damage for such land as may be taken for the purpose of widening said channel." This instrument also defines, approximately, the line bounding the land proposed to be released, and on the tracing[1] herewith a line is shown in heavy full red, which has been submitted to the parties in interest and is acknowledged by them to correspond with their intentions in the matter of release.

Stamford Harbor consists of two branches, which have been known and referred to in the reports as East and West Branch. Appropriations have been applied sometimes to the one and sometimes to the other, and sometimes partly to both. The programme submitted and approved for the expenditure of the present appropriation contemplates work in both branches. The East Branch was originally improved, as a private undertaking, by digging a narrow cut through it, which came to be known as the "Canal." Subsequently, the work was taken in charge by the United States and further developed. At present there is a channel substantially 9 feet deep at mean low water, 60 to 80 feet wide from the outer harbor to the steamboat dock (about 8,000 feet), and thence, for 1,200 feet, 40 to 60 feet wide. The latter stretch is the locality to which this communication relates. An examination of the map herewith will show that the natural banks here approach each other much more closely than at any other point in the harbor. It is probably for this reason that the dredged widths are less here than elsewhere, in view of the fact that, if commercial requirements had been consulted without any topographical restrictions, the widths here would probably have been greater than elsewhere. The area actually dredged is shown by a light full orange line on the tracing. The limits of the project adopted for the 50-foot channel are shown in the broken red line, and it would appear that the natural widths are not sufficient to allow the channel of that width to be completed without invasion of private rights.

It is asserted that a considerable majority of the business of the entire harbor is transacted in the East Branch. The last statistics on file in this office in which the two branches were separated—those of 1893—showed a tonnage of 172,339 with a valuation of $6,300,000 in the East Branch, as against a tonnage of 61,000 with a valuation of $295,000 in the West Branch. As practically all the commerce of the East Branch is handled in this narrow reach, it may be safely assumed that this stretch is the busiest part of Stamford Harbor.

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[1] Not printed.

The development of terminal facilities on both sides of this reach appears extremely probable in the near future, and should such be the case even the project width of 50 feet will be insufficient; for, if a vessel should be lying at the dock on the west side, and a second vessel lying immediatly opposite at the dock on the east side—a reasonable contingency—there would not remain room for a third vessel to pass them, going up or down. It appears probable that at an early date the interests of commerce will require a widening of the channel at this point to not less than 80 or 90 feet; and steps to make such widening possible, without cost to the United States for land damages, would appear to be a very reasonable and prudent present proceeding. I have therefore the honor to recommend that a harbor line be established in the position shown on the map[1] in full red, marked "Proposed harbor line," contingent upon such documents of release as may be required being executed by the riparian owners of all land, title, and interest lying outside the said harbor line; and that in connection with this establishment of harbor line and cession of land the project be amended by making the east line of the dredged channel parallel to, and 15 feet distant from, the new harbor line.

Very respectfully, your obedient servant,

Smith S. Leach,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. Army.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division,
New York, May 8, 1899.

Respectfully forwarded to the Chief of Engineers.

The establishment of harbor lines on the East Branch, Stamford Harbor, Connecticut, seems desirable; but since the stream is a public highway, the custom of deferring such establishment until after a public hearing has been held should not be dispensed with. It is recommended, therefore, that a public hearing be given and that thereafter lines for both banks, acceptable to all riparian owners, be submitted for the action of the Secretary of War.

In this connection attention is invited to report of Board on Harbor Lines for this harbor, dated February 24, 1890, pages 682–685 Annual Report Chief of Engineers, 1890, Part I.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

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[1] Not printed.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
May 10, 1899.

Respectfully returned to Major Leach, attention being invited to the views of the division engineer in first indorsement hereon, which are concurred in by this office.

Major Leach is authorized to hold a public hearing, due notice of which to be given to all interested parties.

A. MACKENZIE,
Acting Chief of Engineers.

(Through the Division Engineer.)

[Third indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York, May 13, 1899.

Respectfully returned to Major Leach, inviting attention to preceding indorsement.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Fourth indorsement.]

U. S. ENGINEER OFFICE,
New London, Conn., June 22, 1899.

Respectfully returned to the Chief of Engineers, U. S. Army.

The public hearing required by the second preceding indorsement was duly held, and attention is respectfully invited to the report of the same accompanying this paper.

SMITH S. LEACH,
Major of Engineers.

(Through the Division Engineer.)

[Fifth indorsement.]

NORTHEAST DIVISION, ENGINEER OFFICE,
New York, June 23, 1899.

Respectfully returned to the Chief of Engineers, concurring in the views of the district officer.

If the proposed provisional line receive the approval of the Secretary of War, it is recommended that the papers be returned to the district officer, in order that the lines may be located instrumentally and described actually before final action is taken by the Secretary of War.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Sixth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
June 27, 1899.

Respectfully submitted to the Secretary of War.

It appearing from representations of riparian owners that the establishment of harbor lines in the upper part of the east branch of Stamford Harbor, Connecticut, was desirable, Major Leach, the district engineer officer, was directed to hold a public hearing and suggest lines that would be acceptable to all riparian owners.

A public hearing was held in Stamford, after advertisement in the local papers, and the subject carefully considered. Attention is respectfully invited to the report of Major Leach, dated the 22d instant, herewith.

He expresses the opinion that the lines shown in red on the accompanying tracing, marked "A," are suitable ones to be established by the Secretary of War, and this opinion is concurred in by the Division Engineer, Col. G. L. Gillespie, Corps of Engineers.

If satisfactory to the Secretary of War, I recommend that the papers be returned to Major Leach to have the lines located instrumentally and described by established metes and bounds before being finally approved.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Seventh indorsement.]

WAR DEPARTMENT, *July 5, 1899.*

Let the papers be returned to Major Leach for the action recommended by the Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCHOFIELD,
Chief Clerk.

[Eighth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
July 7, 1899.

Respectfully returned to Major Leach, inviting attention to the action of the Department as shown by the sixth and seventh indorsements hereon.

By command of Brig. Gen. Wilson:

A. MACKENZIE,
Lieutenant-Colonel, Corps of Engineers.

[Thirteenth indorsement.]

U. S. ENGINEER OFFICE,
New London, Conn., November 29, 1899.

Respectfully returned to the Chief of Engineers U. S. Army, with a tracing[1] showing the provisionally adopted harbor lines as finally instrumentally located, and a manuscript containing the description of these lines by established metes and bounds, submitted for the final action of the Secretary of War, in accordance with the requirements of the seventh indorsement.

SMITH S. LEACH,
Major of Engineers.

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[1] Not printed.

[Fifteenth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
December 5, 1899.

Respectfully returned to the Secretary of War.

These papers relate to the establishment of harbor lines in the upper part of the east branch of Stamford Harbor, Connecticut, and previous action in the case will be seen by reference to sixth and seventh indorsements hereon.

The local officer now submits a map on which are shown in red the harbor lines, as finally instrumentally located, recommended by him for adoption and described by metes and bounds in the accompanying paper.

I recommend that these lines be approved and that the Secretary place his approval on the map which has been prepared for his signature.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

NOTE.—The lines referred to in the above letter, and shown on the map accompanying, were approved by the Secretary of War under date of December 13, 1899, the approval being indicated on the map.

REPORT OF MAJ. SMITH S. LEACH, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
New London, Conn., June 22, 1899.

GENERAL: I have the honor to submit the following report of a public hearing held at Stamford, Conn., on the question of the establishment of a harbor line in the upper part of the east branch of Stamford Harbor, pursuant to the second indorsement on 31032.

Notices of the hearing to be held on June 14 were published for three insertions in four local papers at Stamford.

The hearing was opened at 2 p. m. June 14, at the office of Getman, Judd & Co., in Stamford, the time and place mentioned in the advertisement. A large majority of the interested parties were represented at the hearing, either in person or by written communication. Attention is invited to a document[1] inclosed herewith, bearing certain signatures, which include those of all the riparian proprietors who could be reached, except the New York, New Haven and Hartford Railroad Company, which company is known to be favorable to the project, as it is one of the principal sufferers from the present deficiency in width of channel, and has subscribed to the private fund which is to be expended in connection with the Government operations in widening the channel and rebuilding the retaining wall. A map of this portion of the harbor was exhibited, having drawn on it a suggested harbor line. This harbor line accords with that described by the petitioners as acceptable to them, and was acquiesced in by all interested parties present at the hearing. I have since received information that the map has been exhibited to a number of other interested parties who were not present at the hearing, and that the line indicated thereon gives general satisfaction. No objection was heard from any quarter. It should be noted, however, that the frontage on the east side of the stream, below the small bay or cove, and which is marked on the map "salt marsh," is land of a character which has no present value, and has not up to this time had any prospective value. Its ownership is very difficult to ascertain, and no representatives of that property could be found. This portion of the line is drawn parallel to the dredged channel and as near to its margin as is prudent. The limits of possible variation are exceedingly small, and it does not appear that any valid objection to this line could be raised by owners of the property in question. Its establishment at the present time is important in connection with the line opposite. Both should be established simultaneously.

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[1] Not printed.

The particular demand which opened this subject in the first instance, that for widening at a point opposite Waterbury's coal yard on the map by taking a strip of the land owned by Leonard Blondel, I found on personal examination of the locality to be an urgent necessity. While the hearing was in progress a three-masted schooner was discharging at a lumber dock in this stretch, and there was not room between her outer gunwale and the opposite side of the channel for an ordinary sailboat to pass. It is a common occurrence for vessels to be delayed from one to four days in getting a berth in the wider stretch above this narrow gorge, the length of delay depending upon the obstinacy of the captain whose vessel forms the obstruction. Several cases were reported to me in which the captains were paid for the trifling concession of shifting their vessel long enough to allow a second vessel to pass through the channel.

After a careful study of the subject and in view of all the information developed at the hearing I have the honor to state that in my opinion the lines shown on the accompanying tracing, marked "suggested harbor lines," are suitable ones to receive the approval of the Secretary of War as lawful harbor lines, it being understood, in accordance with the tenor of the papers in this case, that the United States is to be held free from all claim for the value of land, or damages thereto, resulting from the establishment of the harbor line across the land of Leonard Blondel, as described.

If it be proposed to adopt this line I would respectfully suggest that the papers be returned to me, and that I be authorized to have the lines instrumentally determined and marked on the ground and to submit a description by established metes and bounds.

Very respectfully, your obedient servant,

SMITH S. LEACH,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

DESCRIPTION BY METES AND BOUNDS OF HARBOR LINES IN EAST BRANCH OF STAMFORD HARBOR, CONN., ESTABLISHED IN 1899.

[All bearings are magnetic.]

Section No. 1.—Starting on the west side of the harbor, about 75 feet southerly from the south side of Ludlow street, at the south end of Hoyt's dock, and 2 feet easterly from the face of the top stone, Section No. 1 extends N. 13° 30′ E. 255 feet to an intersection with Section No. 2.

A point on Section No. 1 produced southward may be located from Monument No. 1, which is a 1-inch bronze bolt marked 1, set with sulphur in large flat rock at high-water line near point of woods near east bank of canal; from this monument 125 feet on line to northeast corner of Blickinsderfer's vault in cemetery (bearing S. 70° 45′ W.) is the point of intersection with Section No. 1 of harbor line produced.

A point on Section No. 1 produced northward is located by a marble merestone 4½ inches square, 2 feet long, set 2 inches out of ground, 6 feet from back side of Stamford pumping station, 15 feet east of west end of the same and marked: U. S. No. 2.

Section No. 2.—Starting from the above intersection with Section No. 1, Section No. 2 extends N. 0° 43′ E. 330 feet to an intersection with Section 3.

A point on Section 2 produced southward is located by a marble merestone 4½ inches square, 2 feet long, set 2 inches out of ground, at edge of meadow belonging to Edward Scofield, on east side of small bushy point and 30 feet south of same. Said bushy point is next east of high point near canal and is southwest of hummock in meadow. Stone is marked: U. S. No. 3.

A point on Section No. 2 produced northward is located by a 1-inch bronze bolt, marked 4, set in stone with Portland cement, flush with top, in wall at north side of cove opposite steamboat dock and near east end of wall, 98 feet easterly from two drill holes marked 11, and 123 feet easterly from present bank of canal; near the bolt a figure 4 is cut in the stone.

Section No. 3.—Starting from the above intersection with Section No. 2, Section No. 3 extends N. 10° 30′ W. 745 feet, touching the outside of the most easterly pile at southeast corner of Beck & Co.'s wharf, to an intersection with Section No. 4; the latter point of intersection being located by a 2-inch lag screw with washer on top of oak pile at southeast corner of steamboat dock and letters cut in head of pile thus: U.S. □ A.

A point on Section No. 3 produced southward is located by a 1-inch bronze bolt, marked 5, set in bottom stone in north side of wall between meadow and pasture, and is 62.5 feet easterly from west end of wall, where wall turns and joins dike, on property of Edward Scofield.

A point on Section No. 3 produced northward is located by a 2-inch lag screw on top of southeast pile at southeast corner of steamboat dock; letters are cut in the wood thus: U.S. □ A.

Section No. 4.—Starting from above intersection with Section No. 3, Section No. 4 extends N. 14° 31′ W. 253 feet along front of dock, as near as may be, to an intersection with Section No. 5, the latter point of intersection being located by head of 2-inch lag screw on string-piece, 6 inches from top of the same, and 75 feet south of north boundary of steamboat property. Letters are cut in stringpiece thus: U.S. □ B.

Section No. 5.—Starting from above intersection with Section No. 4, Section No. 5 extends N. 16° 19′ W. 226 feet to an intersection with Section No. 6, the latter point of intersection being located by head of 2-inch lag screw on fender chock over pile at corner in Waterbury's dock, and 4 inches in front of face of string-pieces where they meet in corner. Letters are cut in wood thus: U.S. □ C.

Section No. 6.—Starting from above intersection with Section No. 5, Section No. 6 extends N. 25° 53′ W. 60 feet along front of dock to an intersection with Section No. 7, the latter point of intersection being located by head of 2-inch lag screw on face of string-piece, near the bottom of the same, and 60 feet northerly from sharp angle in Waterbury's dock; letters are cut in string-piece thus: U.S. □ D.

Section No. 7.—Starting from the above intersection with Section No. 6, Section No. 7 extends N. 27° 17′ W. 251 feet along front of docks to an intersection with Section No. 8, the latter point of intersection being located by head of 2-inch lag screw on string-piece, 3 inches from top of the same, and 19 feet northerly from the break in the deck of Boyd Bros. dock; letters are cut in string-piece thus: U.S. □ E.

Section No. 8.—Starting from the above intersection with Section No. 7, Section No. 8 extends N. 28° 56′ W. 130 feet to an intersection with Section No. 9, the latter point of intersection being located by head of 2-inch lag screw on the front of a 5

by 7 chock set between piles, and 149 feet northerly from the division line between the properties of Getman & Judd and Boyd Bros.; letters are cut in the wood thus:
U.S.
□
F.

Section No. 9.—Starting from the above intersection with Section No. 8, Section No. 9 extends N. 29° 44′ W. 198 feet to an intersection with Section No. 10 in corner in Dean & Horton's dock, the latter intersection point being located 3½ feet easterly from head of 2-inch lag screw on string-piece, 2 inches below top of the same, and over stone wall; letters are cut in string-piece thus:
U.S.
□
G.

Section No. 10.—Starting from the above intersection with Section No. 9, Section No. 10 extends N. 33° 13′ W. 246 feet along front of docks to an intersection with Section No. 11, the latter point of intersection being located by head of 2-inch lag screw in fence, over corner where Getman & Judd's dock meets railroad dock and 3 inches above southwest corner of most westerly cap stone in railroad dock; letters are cut in fence thus:
U.S.
□
H.

Section No. 11.—Starting from the above intersection with Section No. 10, Section No. 11 extends N. 71° 10′ E. 142 feet along front of railroad dock to an intersection with Section No. 12, the latter point of intersection being located by head of 2-inch lag screw in dock log on Blondel's dock, 6 inches below top of the same, under the fence post, which is 4 inches south of the north end of the dock log; letters are cut in wood thus:
U.S.
□
I.

Section No. 12.—Starting from the above intersection with Section No. 11, Section No. 12 extends S. 24° 20′ E. 303 feet along front of Blondel's dock to an intersection with Section No. 13, the latter point of intersection being located at south end of last dock log and 2 feet west from head of 4-inch spike; letters are cut in wood thus:
U.S.
□
J.

Section No. 13.—Starting from the above intersection with Section No. 12, Section No. 13 extends S. 25° 45′ E. 563 feet to an intersection with Section No. 14 at a point 2 feet west of spike in end of dock log at south end of Blondel's dock.

A point on Section No. 13 produced northward is located by a 2-inch lag screw in hoisting derrick in front of Blondel's dock.

A point on Section No. 13 produced southward is located by a 1-inch bronze bolt, marked 13, in wall at north side of cove opposite steamboat dock, 66 feet easterly from present bank of canal and 41 feet easterly from the two drill holes marked 11, which were used in locating Section No. 2; bolt is between two drill holes in line, and figures 13 are cut in stone near it.

Section No. 14.—Starting from the above intersection with Section No. 13, Section No. 14 extends S. 18° 50′ E. 306 feet to two drill holes in line in top of stone wall on north side of cove opposite steamboat dock, marked 11 (cut in stone near south hole), said holes being 25 feet easterly from present canal bank.

A point on Section No. 14 produced northward is located by a 1-inch bronze bolt, marked 12, set in stone wall at bottom of board fence at south side of Blondel's coal yard, with Portland cement flush to top, and is 30 feet west of corner of fence at Meadow street.

A point on Section No. 14 produced southward is located by a marble mere-stone 4½ inches square, 2 feet long, 3 inches out of ground, marked
U. S.
No. 11
, 20 feet easterly from present canal bank.

Section No. 15.—Starting from a point located as follows: on south side of entrance to cove opposite steamboat dock, about 25 feet westerly from high-water line, and on line from monument No. 19, which is a marble mere-stone 4½ inches square, 2 feet long, 1 inch out of ground, situated 93 feet westerly from southwest corner of dike, to intersection point of sections 3 and 4, marked
U.S.
□
A.
, bearing S, 58° 30′ E., and distant 168 feet from said intersection point; Section No. 15 extends S. 11° 45′ E. 625 feet to an intersection with Section No. 16.

A point on Section No. 15 produced northward is located by a 1-inch bronze bolt, marked 10, in stone wall at north side of cove opposite steamboat dock, near the figures 10 cut in the stone, 24.4 feet easterly from two drill holes marked 11, and 49.4 feet easterly from present canal bank.

A point on Section No. 15 produced southward is located by a 1-inch bronze bolt, marked 9, in bottom stone on north side of wall between meadow and pasture, on the property of Edward Scofield, and is 50 feet westerly from corner at east end of wall, where stands a large wild-cherry tree.

Section No. 16.—Starting from the above intersection with Section No. 15, Section No. 16 extends S. 0° 45′ E. 570 feet to the end of the harbor line as now established on the east side of the harbor.

A point on Section No. 16 produced northward is located by a marble mere-stone 4½ inches square, 2 feet long, 1½ inches out of ground, marked $\boxed{\begin{array}{c}\text{U. S.}\\ \text{No. 8.}\end{array}}$, back of Dennis Dempsey's house, 18 feet from his line in E. Meadow street, and 53 feet northeasterly from corner of fence.

A point on Section No. 16 produced southward is located by a marble mere-stone 4½ inches square, 2 feet long, 1 inch out of ground, marked $\boxed{\begin{array}{c}\text{U. S.}\\ \text{No. 7.}\end{array}}$, in hummock in meadow easterly from prominent point on the eastern bank of the canal and 25 feet from eastern end of hummock and 10 feet south of the line of the salt marsh.

APPENDIX F.

IMPROVEMENT OF RIVERS AND HARBORS IN NEW YORK ON LONG ISLAND SOUND, ON THE SOUTHERN SHORE OF LONG ISLAND, AND OF HARLEM AND EAST RIVERS, NEW YORK.

REPORT FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS. OFFICERS IN CHARGE, LIEUT. COL. W. H. H. BENYAURD, MAJ. W. L. MARSHALL, AND MAJ. E. H. RUFFNER, CORPS OF ENGINEERS.

IMPROVEMENTS.

1. Port Chester Harbor, New York.
2. Mamaroneck Harbor, New York.
3. Larchmont Harbor, New York.
4. East Chester Creek, New York.
5. Bronx River, New York.
6. Mattituck Harbor, New York.
7. Port Jefferson Harbor, New York.
8. Huntington Harbor, New York.
9. Glencove Harbor, New York.
10. Flushing Bay, New York.
11. East River and Hell Gate, New York.
12. Harlem River, New York.
13. Newtown Creek, New York.
14. Wallabout Channel, New York.
15. Canarsie Bay, New York.
16. Browns Creek, Sayville, Long Island, New York.
17. Patchogue River, New York.
18. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEYS.

19. Port Chester Harbor, New York.
20. New Rochelle Harbor and Echo Bay, New York.
21. Westchester Creek, New York.
22. Diamond Reef and Coenties Reef, East River, New York.
23. Bay Shore, Long Island, New York.
24. Patchogue River, New York, from Fire Island to Patchogue.
25. Patchogue River, New York.
26. Sag Harbor, New York.
27. Three-mile Harbor, Long Island, New York.

HARBOR LINES.

28. East River, New York, from Oak Point to Bronx River.
29. East River, New York, from Thirty-seventh to Thirty-eighth street.

United States Engineer Office,
New York, N. Y., July 18, 1900.

General: I have the honor to transmit herewith annual reports upon the works of river and harbor improvement under my charge, for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

E. H. Ruffner,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

F I.

IMPROVEMENT OF PORT CHESTER HARBOR, NEW YORK.

Port Chester Harbor is on the boundary line between the States of New York and Connecticut. It consists of the tidal part of Byram River and of a bay at its mouth.

PROJECTS FOR IMPROVEMENT.

In 1872 a project for improvement was adopted, which, as subsequently modified, consists in removing Salt Rock to 9 feet below mean low water, building a breakwater from Sunken Rock to Byram Point, and dredging to make and maintain a navigable channel to the Port Chester wharves, at a total cost of $57,000.

This project has been completed, except the dredging in the upper harbor.

By act of Congress approved March 3, 1899, an appropriation of $25,000 was made "to be expended in enlarging the channel below and up to Town Dock to a depth of 12 feet and a width of 70 feet, and from Town Dock to the steamboat dock to a depth of 9 feet and a width of 60 feet."

A project for the expenditure of the available funds in accordance with the terms of this act was submitted, and was approved by the Secretary of War March 20, 1899.

The length of the channel from deep water up to Town Dock is about 2,500 feet, and thence up to the steamboat dock about 4,200 feet.

Detailed descriptions of the harbor and of the project for improvement are printed in the Annual Report of the Chief of Engineers for 1897, page 1084.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under the appropriation of $25,000 made by the river and harbor act of March 3, 1899, bids were opened on May 17, 1899, but being considered too high were rejected. Under a new advertisement dated July 10, bids were opened August 12, 1899, and a contract dated August 29, 1899, and expiring April 24, 1900, was entered into with the Newburgh Dredging Company for dredging and rock removal necessary to complete the project. Dredging under this contract was commenced on November 2, 1899, and was suspended for the winter on December 16. Work was resumed on April 14, 1900, and under an extension of the contract to August 24, 1900, has continued since that date.

At the close of the fiscal year the channel 12 feet deep and 70 feet wide up to Town Dock had been completed, and the channel 9 feet deep and 60 feet wide had been carried up a distance of 2,400 feet above the Town Dock. The amount of material removed during the year was 50,076 cubic yards.

There remains for the completion of the present contract dredging for the channel a length of 1,700 feet from the present end of the work to the steamboat dock and the removal of about 650 cubic yards of rock at different points along the channel to make it of the required dimensions.

Under the terms of the river and harbor act of March 3, 1899, a report upon preliminary examination of Port Chester Harbor, dated September 13, 1899, was submitted.

PRESENT CONDITION OF IMPROVEMENT.

Salt Rock has been removed to a depth of 9 feet below mean low water. The breakwater has been built from Sunken Rock to high-water mark on the rocks at Byram Point, leaving a gap 30 feet wide near the shore end to allow small boats to pass through at high tide. The end of the breakwater has been built up to 15 feet above low water to serve as beacon upon Sunken Rock. A light is maintained there by the Light-House Department.

A channel has been dredged from the 12-foot curve in the harbor up to the Town Dock, a distance of 2,500 feet, with depth of 12 feet at mean low water, and width of 70 feet; from the Town Dock up it has been dredged 9 feet deep and 60 feet wide for a length of 2,400 feet. Above the steamboat landing the depth is 2½ feet at mean low water.

PROPOSED OPERATIONS.

The available funds will be applied to completion of work under contract and maintenance of channel.

Port Chester Harbor is in the collection district of New York. The nearest light-house is on Great Captains Island, 1¾ miles east of the mouth of the harbor. The nearest work of defense is Fort Slocum, N. Y., 9 miles to the southwest.

Money statement.

July 1, 1899, balance unexpended		$24,963.97
June 30, 1900, amount expended during fiscal year		7,317.05
July 1, 1900, balance unexpended		17,646.92
July 1, 1900, outstanding liabilities	$3,277.10	
July 1, 1900, amount covered by uncompleted contracts	10,746.32	
		14,023.42
July 1, 1900, balance available		3,623.50
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement		5,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations for improving Port Chester Harbor, New York, have been made as follows:

Application.	Date.	Amount.
Removing Salt Rock	June 10, 1872	$12,000
Dredging in Byram River and Bay	Aug. 2, 1882	15,000
Breakwater	Aug. 11, 1888	5,000
Do	Sept. 19, 1890	5,000
Do	July 13, 1892	5,000
Breakwater and dredging	Aug. 18, 1894	5,000
Dredging 6 feet depth	June 3, 1896	5,000
Dredging	Mar. 3, 1899	25,000
Total		77,000

Abstract of proposals for dredging and rock excavation in Port Chester Harbor, New York, received in response to advertisement dated July 10, 1899, and opened August 12, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers.

No.	Name and address of bidder.	Dredging 78,000 cubic yards (per cubic yard).	Rock excavation, 650 cubic yards (per cubic yard).	Total.
a1	The Newburgh Dredging Co., Newburgh, N. Y	$0.18	$8.80	$19,760
2	The Hartford Dredging Co., Hartford, Conn	.21	10.00	22,880
3	The International Dredging Co., Syracuse, N. Y	.19	9.00	20,670

a Lowest bid.

CONTRACT IN FORCE.

Name of contractor: The Newburgh Dredging Co.
Date of contract: August 29, 1899.
Date of approval: September 25, 1899.
Date of commencement: On or before October 25, 1899.
Date of completion: On or before April 24, 1900.

Excavating and removing 78,000 cubic yards, more or less, of mud, sand, gravel, small bowlders, etc., at 18 cents per cubic yard.

Excavating and removing 650 cubic yards, more or less, of ledge rock and bowlders, of one-half yard volume or over, at $8.80 per cubic yard,

Work was begun on November 2, 1899, and was suspended December 16, 1899. Work was resumed April 14, 1900.

Date of completion was extended to August 24, 1900.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through courtesy of Mr. E. F. Studwell, Port Chester, N. Y.]

Freight received and shipped by water.

Articles.	Tons.	Estimated value.
Received:		
Coal and coke	45,000	$200,000
Building materials	35,000	157,000
Miscellaneous	60,000	1,800,000
Shipped:		
Farm produce	4,500	99,000
Manufactured goods, etc	25,000	4,000,000
Total	169,500	6,256,000

Vessels engaged in above commerce.

Class.	Number of trips.	Draft, loaded.	Tonnage.
		Feet.	*Tons.*
Steamers	430	5 to 10	20 to 268
Steam tugs	550	4 to 9	10 to 80
Sail vessels	100	6 to 13	4 to 400
Barges, etc	340	5 to 10	100 to 800
Total	1,420	....	....

The above figures show an increase of 29,500 tons in amount of freight over that reported for 1898.

During the last 18 days of June, 1900, from record kept by the inspector of dredging, it is shown that 90 vessels entered and left the harbor during that period, with a total of 4,728 tons of freight, valued at $108,484.

No new lines of transportation are reported as established since July 1, 1899.

F 2.

IMPROVEMENT OF MAMARONECK HARBOR, NEW YORK.

Mamaroneck Harbor, on the north shore of Long Island Sound, about 5 miles west from the Connecticut State line, consists of an open shallow bay and a narrow tidal inlet about a mile long.

The channel to the old steamboat wharf (about halfway up the inlet) had a depth of 5 feet at mean low water. From there to the upper wharves the depths gradually decreased to 1 foot. At and near its mouth the inlet was obstructed by several rocks.

The mean rise of tide at Mamaroneck is about 8 feet.

PROJECT FOR IMPROVEMENT.

A survey of the harbor was made in 1881, in pursuance of the river and harbor act of that year, and a project for improvement was submitted, and under the river and harbor act of 1882 was adopted. This project consisted in removing Round Rock, in the upper channel, to a depth of 4 feet at mean low water; in removing five other rocks (Bush Rock, part of Nells Rock, Inner Steamboat Rock, Outer Steamboat Rock, and Little Nanhook) to a depth of 7 feet, and in dredging a channel 7 feet deep and 100 feet wide from Long Island Sound to the old steamboat wharf, and thence 4 feet deep and 80 feet wide to the upper wharves, together with the closing of a small channel east of "Grassy Knoll," at a total estimated cost of $43,000.

Under appropriations made in 1882 and 1896 Round Rock was removed to 4 feet below mean low water, and Bush and Inner Steamboat rocks to 7 feet depth, and a channel 60 feet wide and 6 feet deep at mean low water was dredged to the upper steamboat dock (a distance of about 3,000 feet) and was extended 200 feet farther with 35 feet width.

By act of Congress approved March 3, 1899, an appropriation of $7,000 was made to continue the improvement.

Since the adoption of the project of 1882, conditions in Mamaroneck Harbor have changed. The old steamboat wharf, where it was supposed that most of the water freighting would be transacted, has been practically abandoned, and business transferred to the upper wharves. Under these conditions it was found that the three rocks remaining to be removed are not nearly as serious an obstruction as the scant depth in the upper harbor. In submitting the project for the available funds it was therefore recommended that the present project be modified so as to omit the removal of the three outer rocks, and to extend the channel 7 feet deep and 100 feet wide, from the old steamboat wharf to the upper wharves without changing the estimated cost for completion. The project as modified was approved by the Secretary of War April 27, 1899.

A sketch of Mamaroneck Harbor was printed in the Annual Report of the Chief of Engineers for 1886, page 658.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under contract with James McSpirit & Sons dated July 13, 1899, for the removal of about 22,000 cubic yards of mud, sand, gravel, etc., at 27½ cents per cubic yard, and $8 per cubic yard for rock removal, dredging was commenced on September 21, and the contract was completed on October 30, 1899. The work done consisted in widening the dredged channel 30 feet from its entrance to the head of navigation, a distance of 3,600 feet; the depth made was 7 feet at mean low water. Under this contract 22,677 cubic yards of mud, sand, gravel, etc., and one-half cubic yard of rock were removed.

PRESENT CONDITION OF IMPROVEMENT.

Round Rock has been removed to a depth of 4 feet at mean low water, and Bush and Inner Steamboat rocks to 7 feet depth.

A channel 7 feet deep at mean low water, the result of dredging, extends from the 7-foot curve in the harbor, with width of 90 feet, 1,000 feet to the old steamboat dock; thence to the upper wharves, a distance of 2,600 feet, the 7-foot channel is from 70 to 80 feet in width.

Mamaroneck Harbor is in the collection district of New York. The nearest light-house is on Execution Rock, about 4 miles south. The nearest work of defense is Fort Slocum, N. Y., 5 miles to the south-southwest.

Money statement.

July 1, 1899, balance unexpended	$6,977.03
June 30, 1900, amount expended during fiscal year	6,888.83
July 1, 1900, balance unexpended	88.20
Amount (estimated) required for completion of existing project	11,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	11,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for improving Mamaroneck Harbor, New York, have been made as follows:

Application.	Date.	Amount.
Removal of rocks	Aug. 2, 1882	$15,000
Dredging	June 8, 1896	10,000
Do	Mar. 3, 1899	7,000
Total		32,000

CONTRACT IN FORCE.

Name of contractor: James McSpirit & Sons.
Date of contract: July 13, 1899.
Date of approval: July 25, 1899.
Date of commencement: On or before September 23, 1899.
Date of completion: On or before December 22, 1899.

Dredging 22,000 cubic yards of sand, mud, gravel, etc., at 27½ cents per cubic yard, and removal of rock at $8 per cubic yard.

Work was begun on September 21, 1899, and was completed October 30, 1899.

COMMERCIAL STATISTICS.

A statement of commerce for the calendar year 1899 has been asked for, but not yet received. Following are the commercial statistics reported for the calendar year 1897:

Arrivals and departures of vessels.

Kind of vessel.	Number of round trips.	Draft.	Tonnage.
		Feet.	*Tons.*
Steamers (2)	150	7 to 8	54 to 113
Steam tugs (5)	90	....	....
Sail vessels	6	7 to 9	120 to 200
Barges, canal boats, etc	90	7 to 9	100 to 650
Total	336	....	....

Freight received and shipped by water.

Articles.	Received.		Shipped.	
	Tons.	Estimated value.	Tons.	Estimated value.
Coal	11,800	$47,200	....	....
Building materials	6,873	68,730	....	....
Crushed stone	9,000	11,250	....	....
Railroad ties, iron, and miscellaneous	21,000	630,000	3,000	$120,000
Total	48,673	757,180	3,000	120,000

The total tonnage of above commerce, 51,673 tons, is greater than that reported for 1896 by 19,578 tons.

No new lines of transportation are reported established since July 1, 1899.

F 3.

IMPROVEMENT OF LARCHMONT HARBOR, NEW YORK.

Larchmont Harbor is a bay on the northwest shore of Long Island Sound, about 25 miles by water from the Battery, New York City, and 6 miles southwest from the boundary between the States of New York and Connecticut.

The harbor is about half a mile wide and extends rather more than half a mile inland. It is a basin with no definite channel, the low-water depth of 18 feet at the entrance gradually decreasing toward the shores east, north, and west.

The harbor is chiefly used by the Larchmont Yacht Club, but is more or less sought by small coasters and fishing vessels for refuge or for night anchorage. It is exposed to storms from east to south, and during northeast storms heavy seas roll around Long Beach Point, east of the harbor, and compel vessels to go well up into shoal water for shelter. The entrance is divided into three channels by two rocks, Umbrella Rock, about 800 feet from the west shore, being a large ledge with least depth of 3.1 feet at mean low water, and Huron Rock, about 900 feet southwest from the east shore, a smaller ledge with least depth of 9.8 feet. The channel between the rocks is over 900 feet wide and is the one almost invariably used. There are other rocks inside the harbor which are well known and are marked by spindles; they are too near the west shore to interfere with the use of the harbor for general navigation. The mean range of tides is 7.4 feet.

PROJECTS FOR IMPROVEMENT.

The river and harbor act of August 11, 1888, provided for a survey of Larchmont Harbor, which was made the following year. The report on the survey, dated November 26, 1889, was printed as House Doc. No. 40, Fifty-first Congress, first session, and also in the Annual Report of the Chief of Engineers for 1890, Part I, page 675. With the report were presented two alternative projects for improvement, one for removal of Umbrella and Huron rocks, the other for breakwater to cover each rock and extend to the nearest shore; the cost of removing the rocks to 15 feet depth at mean low water was estimated at $126,000, and the cost of the two breakwaters at $105,000. At the date of the report the preference of those most interested in the harbor was expressed in favor of removing the rocks. After further consideration they changed their views, preferring the breakwater, and in accordance with their petition or request a clause in the first draft of the river and harbor act of 1890 which required that the money appropriated for the harbor be expended "to remove obstructions at mouth of harbor" was stricken out.

The project for constructing two breakwaters at the mouth of the harbor was approved by the Secretary of War September 27, 1890, after the first appropriation for improving the harbor was made. Up to July 1, 1899, 74 linear feet of Umbrella Breakwater and 64 linear feet of Huron Breakwater had been built.

The river and harbor act of March 3, 1899, provided for—

> Improving harbor at Larchmont, New York: Continuing improvement, fifty thousand dollars: *Provided,* That said sum, or such part thereof as may be necessary, may be used by the Secretary of War on such project under any modified plan that may hereafter be adopted by him.

After conference with those most interested in the improvement of the harbor a modified project was submitted to the Chief of Engineers by Maj. H. M. Adams, under date of March 31, 1899, and approved by the Secretary of War April 18, 1899. The modified project for the improvement of this harbor now consists in building a breakwater extending southwardly 1,440 feet from the 6-foot curve off Long Beach Point and in the removal of Huron Rock to a depth of 14 feet at mean low water, at an estimated cost of $108,000.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under the appropriation of $50,000 made by the river and harbor act of March 3, 1899, proposals were opened June 12, 1899. The lowest bid, that of Charles Frey, jr., of New York, at 43 cents per ton, was accepted. Mr. Frey declined to enter into a contract for the work, and it was recommended that the work be readvertised and suit brought against Mr. Frey for the amount of damages sustained by the Government on account of Mr. Frey's act, when such loss could be determined. The work was readvertised, and proposals were opened on September 12, and a contract dated September 26, 1899, and expiring October 1, 1900, was entered into with John P. Conkling, of New

York City, for the delivery of 88,000 tons of stone, at 51 cents per ton. Work under this contract was begun on November 4, and continued until November 25, 1899, during which time the contractor delivered 3,362 tons of stone on line of work. On November 25 work was suspended on account of a strike of the workmen for their pay. This ended work under this contract, and on February 27, 1900, the contractor was notified that if he did not resume work the contract would be annulled. Work was not resumed, and the contract was annulled by authority of the Chief of Engineers on April 13, 1900. Recommendation was made that suit be brought against the contractor and bondsmen when amount of loss to the United States could be ascertained. No payment was made to the contractor for work done. The work was readvertised on April 26; proposals were opened May 28, 1900, and a contract dated June 8, 1900, and expiring June 1, 1901, was entered into with the Anderson-Murphy Company, of New York City, for the delivery of 83,000 tons of stone, at 54 cents per ton. It is expected that work under this contract will begin about the 1st of July.

PRESENT CONDITION OF IMPROVEMENT.

Under previous projects the only public work done in this harbor is the beginning of construction of two breakwaters. Umbrella Breakwater has been made 74 feet long and Huron Breakwater 64 feet long. Both were begun upon the rocks and were built to 10 feet above low water, with top width of 4 feet, the outer ends being slightly higher to serve as beacons on the rocks. At their present lengths they serve no other purpose than to mark the rocks.

Under the present project the breakwater from Long Beach Point has been commenced; stone is spread along the line of work for a length of 300 feet, beginning at a point 200 feet from high-water mark on shore; none of the work is finished.

PROPOSED OPERATIONS.

It is proposed to construct so much of the breakwater as the available funds will permit.

Larchmont Harbor is in the collection district of New York. The nearest lighthouse is on Execution Rock, about 4 miles south. The nearest work of defense is Fort Slocum, N. Y., 5 miles to the south-southwest.

Money statement.

July 1, 1899, balance unexpended	$49,965.07
June 30, 1900, amount expended during fiscal year	279.72
July 1, 1900, balance unexpended	49,685.35
July 1, 1900, amount covered by uncompleted contracts	44,820.00
July 1, 1900, balance available	4,865.35
Amount (estimated) required for completion of existing project	58,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	58,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for improving Larchmont Harbor, New York: $5,000 by act of September 19, 1890; $50,000 by act of March 3, 1899.

Abstract of proposals for building riprap breakwater at Larchmont Harbor, Long Island Sound, received in response to advertisement dated August 12, 1899, and opened September 12, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers.

No.	Name and address of bidder.	Price per ton of 2,240 pounds.	Approximate quantity of stone that can be placed at price bid under available amount, $45,000.
			Tons.
1	The Hudson Contracting Co., 2465 Broadway, New York City	$0.57	78,900
2	Samuel F. Randolph, 80 and 82 Reade street, New York City	.63	71,400
3	John Beattie, Leetes Island, Connecticut	1.10	40,900
a 4	John P. Conkling, 5189 Broadway, New York City	.51	88,200
5	Daniel Toomey, Guildford, Conn	.69	65,200
6	John A. Bouker, 110 Wall street, New York City	.63	71,400

a Lowest bid.

Abstract of proposals for building riprap breakwater at Larchmont Harbor, Long Island Sound, received in response to advertisement dated April 26, 1900, and opened May 28, 1900, by Maj. E. H. Ruffner, Corps of Engineers.

No.	Name and address of bidder.	Price per ton of 2,240 pounds.	Approximate quantity of stone that can be placed at price bid under available amount, $45,000.
		Cents.	*Tons.*
1	Romano V. Perini, 1006 Delaware avenue, Wilmington, Del	89	50,500
2	John A. Bouker, 21-24 State street, New York City	67	67,000
3	Daniel Toomey, Guilford, Conn	59	76,000
a 4	Anderson-Murphy Co., 14 John street, New York City	54	83,000
5	Eugene S. Belden, Hartford, Conn	79	56,500

a Lowest bid.

CONTRACT IN FORCE TO APRIL 13, 1900.

Name of contractor: John P. Conkling.
Date of contract: September 26, 1899.
Date of approval: October 14, 1899.
Date of commencement: November 13, 1899.
Date of completion: October 1, 1900.

Furnishing and placing 88,000 gross tons, more or less, of riprap stone for breakwater, at 51 cents per gross ton.

Work was begun November 4, 1899, and was suspended November 25, 1899.

Contract was annulled April 13, 1900.

CONTRACT AT PRESENT IN FORCE.

Name of contractor: Anderson-Murphy Company.
Date of contract: June 8, 1900.
Date of approval: June 27, 1900.
Date of commencement: On or before July 27, 1900.
Date of completion: On or before June 1, 1901.

Furnishing and placing 83,000 tons, more or less, of riprap stone for breakwater, at 54 cents per gross ton.

COMMERCIAL STATISTICS.

Commercial statistics for the calendar year 1899 have been asked for but not yet received. Following is a statement of commerce for the year 1898:

Number of vessels other than yachts entering harbor of refuge, or for the night, during 1898 (estimated)		300
Draft of such vessels	feet..	4 to 12
Tonnage of such vessels	tons..	10 to 500

Freight discharged in Larchmont Harbor in 1898.

Number of cargoes	75
Amount in tons	4,500

Vessels owned by the Larchmont Yacht Club.

[Draft, from 3 to 19 feet; tonnage, from 3 to 600 tons; total tonnage, 4,500 tons.]

Steamers	64
Schooners	38
Sloops	95
Smaller boats	104
Total	301

No new lines of transportation are reported as established since July 1, 1899.

F 4.

IMPROVEMENT OF EAST CHESTER CREEK, NEW YORK.

East Chester Creek is a small tidal stream which empties into Long Island Sound just east of Throgs Neck and 20 miles by water from the Battery, New York City.

PROJECTS FOR IMPROVEMENT.

In 1873 a project for improvement was adopted which has since been modified, and consists in making a channel 100 feet wide and 9 feet deep at mean high water (about 2 feet at low water), extending from Pelham Bay up the stream to 3,000 feet above Lockwoods, and in removing rocky obstructions from the mouth of the creek. The estimated cost of the modified project is $124,000.

A detailed description of the stream and of the project for improvement is printed in the Annual Report of the Chief of Engineers for 1897, pages 1089–1090.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

It being represented by parties using the channel above Lockwoods that shoaling had occurred which seriously impaired it, an inspection was made, in consequence of which, under date of August 30, 1899, it was recommended that the balance of funds available, amounting to about $1,000, be expended in dredging about 4,000 cubic yards of mud to restore the channel as far as possible to its project depth. This recommendation was approved by the Chief of Engineers under date of September 1 and by the Secretary of War under date of September 5, 1899, and the offer of James McSpirit & Sons to do the work at the rate of 19 cents per cubic yard, the excavated material to be deposited upon the adjacent banks of the creek, was accepted.

Dredging under this agreement was commenced on September 9 and completed on September 19, 1899.

The amount of material removed was 3,937 cubic yards, which sufficed to make one cut along the dock front on the west side of the creek, about 2 feet in depth, 36 feet in width, and 1,000 feet in length, northwardly from a point 300 feet above the Boston Road Bridge at Lockwoods.

PRESENT CONDITION OF IMPROVEMENT.

The project is considered completed. The banks of the cut are considerably disturbed by boats navigating the dredged channel, and dredging will be required from time to time to maintain the improvement.

The channel has been made 9 feet deep at mean high water and about 100 feet wide from Pelham Bridge to a point 3,000 feet above Lockwoods. It is in fair condition.

The dikes on the east side of the cut below Lockwoods, built in 1877-78, show some deterioration. No repair is necessary at present.

East Chester Creek, New York, is in the collection district of New York. The nearest light-house is on the "Stepping Stones," 3 miles southeast of the mouth of the creek. The nearest work of defense is Fort Schuyler, Throgs Neck, about 3½ miles south.

Money statement.

July 1, 1899, balance unexpended	$1,009.50
June 30, 1900, amount expended during fiscal year	811.97
July 1, 1900, balance unexpended	197.53
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	5,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	

Appropriations for improving East Chester Creek have been made as follows:

Application.	Date.	Amount.
Cutting through marsh and rock and diking (in 1877)	Mar. 3, 1873	$25,000
Dredging under Boston Road Bridge and at Goose Island	Mar. 3, 1875	12,000
Dredging near Lockwoods, Goose Island, and Pelham Bridge	June 18, 1878	10,000
Dredging, from 40 to 90 feet wide, from Pell Point to Town Dock	Mar. 3, 1879 June 14, 1880	3,500 3,500
Dredging above Town Dock	Aug. 5, 1886	10,000
Dredging above Lockwoods	Aug. 11, 1888	5,000
Do	Aug. 18, 1894	12,000
Dredging	June 3, 1896	10,000
Total		91,000

No contract in force during fiscal year ending June 30, 1900.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899—ABOVE LOCKWOOD'S BRIDGE.

[Through courtesy of Mr. E. A. Howland, 45 Exchange place, New York City.]

Freight received and shipped.

Articles.	Tons.	Estimated. value.
Received:		
Coal	39,980	$162,300
Building materials, etc	84,388	832,724
Steamer freights, stone, etc	125,400	750,600
Shipped:		
General merchandise, iron, etc	36,660	211,600
Total	286,428	1,957,224

Vessels engaged in above commerce.

Class.	Round trips.	Tonnage.	Draft, loaded.
		Tons.	*Feet.*
Steamers (daily and 5 extra)	500	200 to 800	5 to 10
Sail vessels	28		5 to 8
Barges, etc	311		4 to 8
Total	839		

The amount of freight reported above is 92,508 tons more than reported for 1898. No new lines of transportation are reported as established since July 1, 1899.

F 5.

IMPROVEMENT OF BRONX RIVER, NEW YORK.

The Bronx River is a small stream which flows southwardly through Westchester County and discharges into the East River, New York, about halfway between Hell Gate and Throgs Neck. For the lower 3 miles of its course, from West Farms to the mouth, the river is a tidal stream, navigable at high water. This part of the Bronx River lies wholly within the boundaries of New York City. Excepting a small bay at the mouth, the stream is everywhere narrow, with widths ranging from 50 to 300 feet. The natural depth in the bay is about 4 feet at mean low water, decreasing to 1 foot or less at the West Farms Docks. A short distance above these docks there is a dam which wholly limits navigation.

The navigable part of the river is crossed by two bridges, both with draws; the lower one is a highway bridge, about 2¼ miles above the mouth of the bay; 600 feet above is the bridge of the New York, New Haven and Hartford Railroad, Harlem River branch.

The mean rise of tide in the bay is 6.6 feet; at West Farms it is 5.9 feet.

PROJECT FOR IMPROVEMENT.

The river and harbor act of 1880 provided for a survey of the Bronx River. The report on the survey presented plans for making a channel 30 feet wide and 4 feet deep, at an estimated cost of $42,000. No appropriation was made for beginning work.

A survey of the Bronx River was again made in compliance with the provisions of the river and harbor act of 1890, the report upon which, printed in the Annual Report of the Chief of Engineers for 1891, page 951, presented a project for improvement which was adopted under the terms of the river and harbor act of 1896. This project consists in dredging and removal of rock to make a navigable channel 4 feet deep at mean low water, to be 100 feet wide from the entrance (Strain place) to Barlow street, thence to Dongan street to be 60 feet wide, and thence to the head of navigation at West Farms to be 50 feet wide, at an estimated cost of $85,985.

Harbor lines in the bay at the mouth of Bronx River were established by the Secretary of War January 9, 1891.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under the appropriation of $20,000 made by the river and harbor act of March 3, 1899, and in pursuance of the project for its expenditure, at the beginning of the fiscal year a survey of rocky obstructions had been finished. Under advertisement dated September 2 proposals for rock removal were opened October 3, 1899, and a contract dated October 12, 1899, and expiring June 30, 1900, was entered into with Samuel F. Randolph, of New York City, for removing about 3,000 cubic yards of rock, at $3.78 per cubic yard. Work under this contract was commenced on November 21, 1899, and, with slight interruptions, has been in progress since that date. At the close of the fiscal year 667 cubic yards of rock had been removed from six ledges in the vicinity of Jones Dock and Westchester Avenue Bridge. The depth to be made is 6 feet at mean low water, but none of the work is yet in a finished condition. The contract time has been extended to December 30, 1900.

PRESENT CONDITION OF IMPROVEMENT.

Three ledges lying within the 50-foot channel have been removed, and five ledges partially removed, from a point 1,500 feet below to 350 feet above the Westchester Avenue Highway Bridge, except immediately under and close to the bridge, making a depth of 6 feet at mean low water, where rock was found less than the projected depth of 4 feet. The channel depth up to that point, where the bottom is muddy, is about 3 feet. Above the railroad bridge, where no work has been done, the channel depth is from zero to 2½ feet.

PROPOSED OPERATIONS.

The appropriation now available will be applied to the removal of the worst rock obstructions in the 50-foot channel. This work will be done under the contract in force unless the contractor fails to complete his contract.

The Bronx River is in the collection district of New York. The nearest light-house is on North Brother Island, about 2 miles west from the mouth of the river. The nearest work of defense is Fort Schuyler, Throgs Neck, New York.

Money statement.

July 1, 1899, balance unexpended		$19,786.52
June 30, 1900, amount expended during fiscal year		3,897.94
July 1, 1900, balance unexpended		15,888.58
July 1, 1900, outstanding liabilities	$833.26	
July 1, 1900, amount covered by uncompleted contracts	9,135.04	
		9,968.30
July 1, 1900, balance available		5,920.28
Amount (estimated) required for completion of existing project		55,985.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		55,985.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations for improving Bronx River, New York: $10,000 by act of June 3, 1896; $20,000 by act of March 3, 1899.

Abstract of proposals for removing rock in Bronx River, New York, received in response to advertisement dated September 2, 1899, and opened October 3, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers.

No.	Name and address of bidder.	Price per cubic yard.	Approximate amount of rock that can be removed under available balance, $16,000.
			Cubic yards.
a1	Samuel F. Randolph, 80 and 82 Reade street, New York City	$3.78	4,232
2	Edward J. Hingston, Buffalo, N. Y	5.33	3,001
3	Dennis Toomey, Guildford, Conn	9.75	1,641
4	George A. Rogers, Plattsburg, N. Y	9.47	1,689
5	James McSpirit & Sons, 122 Wayne street, Jersey City, N. J	6.38	2,507
6	Charles W. Johnston, Lewes, Del	7.55	2,119
7	John Beattie, Leetes Island, Connecticut	47.60	336
8	Frank Pidgeon, 315 Madison avenue, New York City	6.66	2,402

a Lowest bid.

CONTRACT IN FORCE.

Name of contractor: Samuel F. Randolph.
Date of contract: October 12, 1899.
Date of approval: October 24, 1899.
Date of commencement: November 14, 1899.
Date of completion: June 30, 1900.
Removal of 3,000 cubic yards of rock, at $3.78 per cubic yard.
Work was begun on November 21, 1899.
Contract was extended to December 31, 1900.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[From information furnished by Olin J. Stephens, One hundred and thirty-eighth street and Canal, New York City, and others.]

Freight received by water (no shipments).

Articles.	Tons.	Estimated value.
Coal	75,800	$303,200
Lumber	3,000	40,000
Cotton goods	10,000	400,000
Drugs for dyeing purposes	5,000	1,000,000
Building material	62,500	200,000
Ice	15,000	42,500
Total	171,300	1,985,700

Arrivals and departures of vessels.

[Draft, 4 to 6 feet; tonnage, 85 to 300 tons.]

	Number.
Steamers of all classes	1,356
Sail vessels	68
Barges, etc	600
Total	2,024

The above figures show an increase over the amount of freight reported for 1898 of 31,990 tons.

No new lines of transportation are reported as established during the past fiscal year.

F 6.

IMPROVEMENT OF MATTITUCK HARBOR, NEW YORK.

Mattituck Harbor is on the north shore of Long Island, about 70 miles east from New York City. It consists of a tidal bay, stream, and inlet from Long Island Sound.

PROJECT FOR IMPROVEMENT.

Under the river and harbor act of 1896 a project for improvement was adopted which consists in making a channel to be 7 feet deep at mean low water and 100 feet wide at the entrance; thence to the milldam 80 feet wide, and extending it to the Mattituck village with a depth of 7 feet at high water and a width of 80 feet, the entrance channel to be protected by parallel jetties. Total estimated cost, $83,000.

Further details as to this harbor and the project for improvement are printed in the Annual Report of the Chief of Engineers for 1897, page 1095, and for 1891, page 843.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

In accordance with the project approved by the Secretary of War June 5, 1900, for the expenditure of the appropriations of $10,000 of

June 3, 1896, and $5,000 of March 3, 1899, proposals were invited, under date of June 28, 1900, for the construction of the west jetty at Mattituck Harbor. Proposals will be opened on July 30.

PRESENT CONDITION OF IMPROVEMENT.

No work has yet been done. The channel is in its natural condition, which is as follows: From the inlet to the milldam the depth is about 2 feet at mean low water; above the milldam the depth is 6 feet at high water; the inlet varies its depth and position owing to the action of storms. The inlet channel will be made permanent by the construction of jetties and by dredging.

PROPOSED OPERATIONS.

It is proposed to apply the available funds to the construction of the west jetty at the inlet.

Mattituck Harbor is in the collection district of New York. The nearest lighthouse is on Hortons Point, about 8 miles to the northeast. The nearest work of defense is Fort Terry, Plum Island, Long Island Sound, distant about 22 miles.

Money statement.

July 1, 1899, balance unexpended	$15,000.00
July 1, 1900, balance unexpended	15,000.00
July 1, 1900, outstanding liabilities	16.84
July 1, 1900, balance available	14,983.16
Amount (estimated) required for completion of existing project	68,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	25,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for improving Mattituck Harbor, New York: $10,000 by act of June 3, 1896; $5,000 by act of March 3, 1999. No expenditures have been made from these amounts.

No contract has been in force during the past fiscal year.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

No statement of amount of tonnage of freights by water has been received. The harbor in its present condition is navigated only by boats of very light draft, and even this is done with difficulty.

The greater part of the freighting to and from Mattituck, estimated at about 100,000 tons in 1896, is done by rail.

F 7.

IMPROVEMENT OF PORT JEFFERSON HARBOR, NEW YORK.

Port Jefferson Harbor is on the north shore of Long Island and about 50 miles east from New York City. It is 2 miles long and averages three-fourths of a mile wide, and a large part of the area has a depth of 18 feet or more at low tide. Tributary to this harbor on the west are Setauket Harbor and Conscience Bay, two shallow tidal basins. Port Jefferson Harbor is surrounded on three sides by hills, and is separated from Long Island Sound on the north by a beach of sand and gravel, through which, and nearly in the axis of the harbor, is a single entrance 400 feet wide. This entrance is Port Jefferson Inlet, and through it a tidal reservoir of 2 square miles in area receives and discharges some 300,000,000 cubic feet of water with every tide, producing a current whose maximum velocity exceeds 4 miles per hour. In the narrow part of the inlet the depths have always been considerable, but a short distance out into the sound was a broad, flat bar, which originally had a depth of 4 feet at low water. Until the beginning of Government improvement in 1871 the location of the inlet had been shifting; since 1838 it has moved westward 790 feet, an average annual rate of 24 feet.

The village of Port Jefferson, with a population of about 3,000, lies at the head or south end of the harbor. The mean rise of tides at the village wharves is 6.2 feet; in Long Island Sound outside the inlet it is 7 feet. The difference is wholly in low-water levels.

PROJECTS FOR IMPROVEMENT.

In 1871 a project was adopted under which, in 1883, a channel 100 feet wide and 8 feet deep at mean low water had been dredged through the inlet, and riprap jetties had been built to protect the channel on either side, at a total cost of $79,000.

In 1890 a project was adopted for enlarging the jetties and dredging the channel 200 feet wide and 10 feet deep; this was modified to provide for 12 feet depth by the terms of the river and harbor act of 1894. Estimated cost, $145,000.

Detailed description of the projects for improvement is printed in the Annual Report of the Chief of Engineers for 1897, page 1097.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under the appropriation of $7,500 made by the river and harbor act of March 3, 1899, and in pursuance of the project approved for its expenditure, bids were opened on September 26, 1899, and a contract dated October 7, 1899, and expiring May 13, 1900, was entered into with the Hudson Contracting Company, of New York City, for the delivery of about 7,800 tons of riprap stone in the jetties, at 89 cents per ton.

The delivery of stone under this contract was commenced on November 8, and was suspended for the winter on November 17, 1899, after 1,112 tons of stone had been delivered in the west jetty. Work was resumed on May 7, 1900, and it was continued under a two months' extension of the contract.

At the close of the fiscal year the contract was not quite completed, and work was still in progress.

The work done up to July 1, 1900, consisted in completing the enlargement of the west jetty, making it 4 feet wide on top and 4 feet above the plane of mean high water the whole length out from high-water line on shore, which is 876 feet. The outer end for a length of

60 feet was made 6 feet above the plane of high water. The east jetty was also widened and raised for a length of 128 feet on the north and south sides of the light-house, which is near the outer end of the jetty. The amount of stone placed in the jetties was 7,253 tons, of which 5,480 tons were used on the west jetty, and the remainder, 1,773 tons, on the east jetty.

PRESENT CONDITION OF IMPROVEMENT.

The east jetty is 1,400 feet long, part of the shore end being covered by sand which has drifted in. It is 6 feet above high-water level and approximately 4 feet wide on top. The jetty is rough, and is in an unfinished condition. It requires building up, trimming, and filling out the side slopes. The outer end, where the light-house is located, is built up in a substantial manner for a length of 128 feet, with width of 24 feet. The west jetty is 940 feet long; it is 4 feet wide on top, 4 feet above high water, and has side slopes of 1 on 1. It is in good condition, due to recent work. The outer part for a length of 60 feet was made 6 feet above mean high water. This jetty is also partly covered with sand on the shore end.

The dredged channel, made 240 feet wide and 10 feet deep, has shoaled on the east side at the inner end, and is now about 200 feet wide. The channel dredged 12 feet, now about 160 feet wide, lies within and on the west side of the 10-foot channel. It has shoaled in places to 11 feet.

Port Jefferson is a port of delivery in the collection district of New York. There is a light-house on Old Field Point, 1½ miles west of the harbor entrance. Fort Schuyler, Throgs Neck, distance 40 miles, is the nearest work of defense.

Money statement.

July 1, 1899, balance unexpended		$8, 272. 52
June 30, 1900, amount expended during fiscal year		3, 876. 77
July 1, 1900, balance unexpended		4, 395. 75
July 1, 1900, outstanding liabilities	3, 429. 60	
July 1, 1900, amount covered by uncompleted contracts	487. 03	
		3, 916. 63
July 1, 1900, balance available		479. 12
Amount (estimated) required for completion of existing project		87, 500. 00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$25, 000. 00	
For maintenance of improvement	8, 000. 00	
		33, 000. 00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations for improving Port Jefferson Harbor have been made as follows:

Application.	Date.	Amount.
For previous projects:		
East jetty	Mar. 3, 1871 June 10, 1872	$15,000 15,000
East and west jetties	Mar. 3, 1875	15,000
East jetty and dredging	Aug. 14, 1876	6,000
East and west jetties	June 18, 1878	8,000
Dredging	Mar. 3, 1879	5,000
East and west jetties	June 14, 1880	3,000
East jetty	Mar. 3, 1881 Aug. 2, 1882	4,000 8,000
Total for the previous projects		79,000
For the present project:		
Enlarging jetties and dredging	Sept. 19, 1890	25,000
Dredging 10 feet deep	July 13, 1892	10,000
Dredging 12 feet deep	Aug. 18, 1894	7,500
Dredging 12 feet deep	June 3, 1896	7,500
Enlarging and strengthening jetties	Mar. 3, 1899	7,500
Total for present project		57,500
Total amount appropriated for this harbor since 1871		136,500

Abstract of proposals for furnishing and placing riprap stone in jetties at Port Jefferson Inlet, New York, received in response to advertisement dated August 26, 1899, and opened September 26, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers.

No.	Name and address of bidder.	Price per ton of 2,240 pounds.	Amount of material that can be placed under available balance.
			Tons.
a1	The Hudson Contracting Co., 2465 Broadway, New York City	$0.89	7,865
2	Daniel Toomey, Guildford, Conn	1.50	4,666
3	John P. Conkling, 5189 Broadway, New York City	.98	7,142
4	Eugene Belden, 217 Laurel street, Hartford, Conn	.97	7,216
5	John Beattie, Leetes Island, Connecticut	.95	7,368

a Lowest bid.

CONTRACT IN FORCE.

Name of contractor: The Hudson Contracting Company.
Date of contract: October 7, 1899.
Date of approval: October 24, 1899.
Date of commencement: November 14, 1899.
Date of completion: May 13, 1900.
Furnishing and placing in jetties about 7,800 gross tons of riprap stone, at 89 cents per ton.

Work was begun on November 9, 1899.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through courtesy of Mr. T. J. Mather, Port Jefferson, N. Y.]

Freight received and shipped.

Articles.	Tons.	Estimated value.
Received:		
Building material	8,050	$11,900
Coal	5,700	26,500
Oysters	9,000	18,000
Grain	2,700	67,500
Ice	780	2,340
General merchandise	[a]3,000	1,000,000
Shipped:		
Lumber	4,500	900
Flour	900	3,800
Farm produce, etc	4,500	15,000
General merchandise	[a]3,000	1,000,000
Total	42,130	2,145,940

[a] Amount of imports and exports by way of Bridgeport, Conn., not furnished for previous report, accounts in part for the large increase of 17,190 tons, valued at $1,785,740, over that reported for 1898.

Vessels engaged in above commerce.

Class.	Number round trips.	Draft, loaded.	Tonnage.
		Feet.	*Tons.*
Steamers	800	3 to 15	10 to 1,000
Sail vessels	450	4 to 14	15 to 1,250
Barges, etc	35	4 to 8	100 to 280
Total	1,285		

No new lines of transportation are reported established during the past fiscal year.

F 8.

IMPROVEMENT OF HUNTINGTON HARBOR, NEW YORK.

Huntington Harbor is a tidal inlet on the north shore of Long Island, extending southward from Huntington Bay to the village of Huntington, and is about 40 miles east from New York City.

PROJECTS FOR IMPROVEMENT.

In 1872 a project was adopted under which, in 1873, a shoal at the harbor entrance was removed and a channel 2,200 feet long, 130 to 150 feet wide, and 8 feet deep at mean low water was dredged up to the town landings, at a total cost of $22,500.

In 1884 this channel had completely filled up.

In 1890 a project was adopted for restoring and maintaining this channel by dredging and piling, at an estimated cost of $32,000.

Detailed descriptions of the harbor and of the projects for improvement are printed in the Annual Report of the Chief of Engineers for 1897, pages 1100, 1101. A sketch of the upper part of the harbor was printed in Annual Report of the Chief of Engineers for 1893, page 976.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

With the appropriation of $7,500 made by the act of Congress approved March 3, 1899, under contract with Du Bois Brothers Dredging Company, dated May 24, 1899, for removal of about 48,500 cubic yards of material, at 13.9 cents per cubic yard, dredging for maintenance of the channel was commenced on July 6, and the contract was completed on August 25, 1899. Forty-eight thousand four hundred and seventy-eight cubic yards of mud and sand, mostly mud, were removed from the west side of the channel throughout its entire length of 4,000 feet, restoring it to a depth of 8 feet at mean low water and widening it about 25 feet on the west side.

PRESENT CONDITION OF IMPROVEMENT.

The dredged channel has been made 200 feet wide from the entrance bend below Ketchum's dock to the bend at the old town dock, a length of 3,700 feet, and 150 feet wide for a length of 300 feet in front of docks above the old town dock, the width over 100 feet being made for purpose of maintenance without diking. The depth made is 8 feet at mean low water.

Huntington Harbor is in the collection district of New York. The nearest lighthouse is on Eatons Point, at the east side of the mouth of Huntington Bay, about 4 miles distant from the harbor. The nearest work of defense is Fort Totten, N. Y., about 20 miles westward.

Money statement.

July 1, 1899, balance unexpended	$7,466.57
June 30, 1900, amount expended during fiscal year	7,455.63
July 1, 1900, balance unexpended	10.94
Amount (estimated) required for completion of existing project	2,500.00
Amount that can be profitably expended in fiscal pear ending June 30, 1902, in addition to the balance available July 1, 1900	2,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations for improving Huntington Harbor have been made as follows:

Application.	Date.	Amount.
For a previous project:		
Dredging	June 10, 1872	$22,500
For the present project:		
Dredging	Sept. 19, 1890	10,000
Do	July 13, 1892	5,000
Do	Aug. 18, 1894	2,000
Do	June 3, 1896	5,000
Do	Mar. 3, 1899	7,500
Total for present project		29,500
Total for Huntington Harbor, both projects		52,000

CONTRACT IN FORCE.

Name of contractor: Du Bois Brothers Dredging Company.
Date of contract: May 24, 1899.
Date of approval: June 6, 1899.
Date of commencement: July 1, 1899.
Date of completion: August 31, 1899.
Dredging 48,500 cubic yards, more or less, of material, at 13.9 cents per cubic yard. Work was begun on July 6 and completed August 25, 1899.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

[Compiled by Mr. James M. Brush, Huntington, N. Y.]

Freight received and shipped.

Articles.	Tons.	Estimated value.
Received:		
Coal	8,000	$40,000
Building material	9,000	180,000
Grain	2,000	40,000
General merchandise	10,000	200,000
Shipped:		
Hay, straw, potatoes, and apples	6,000	120,000
Sand and gravel	10,000	10,000
Pickles and turnips	1,500	15,000
Total	46,500	605,000

Vessels engaged in above commerce.

Class.	Number of trips.	Draft, loaded.	Tonnage.
		Feet.	*Tons.*
Steamers	500	6 to 8½	130 to 250
Sail vessels	130	5 to 12	50 to 200
Barges, etc	75	5 to 6½	200
Total	705	....	....

The above figures show an increase in freight over that for 1897 of 22,916 tons. No new lines of transportation are reported established since July 1, 1899.

F 9.

IMPROVEMENT OF GLENCOVE HARBOR, NEW YORK.

This harbor is a small tidal inlet on the east side of Hempstead Harbor, Long Island, about 27 miles by water from the Battery, New York City.

PROJECT FOR IMPROVEMENT.

In 1888 a project for improvement was adopted. It was modified in 1895, and now consists in building a breakwater in Hempstead Harbor to shelter the anchorage outside Glencove Harbor, the breakwater to be about 2,000 feet long, 3 feet above high water, with top width of 5 feet. The estimated cost is $135,000.

Further details concerning the harbor and project for improvement are printed in the Annual Report of the Chief of Engineers for 1897, page 1103.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

No work of construction has been done.

A red light was maintained upon the outer end of the uncompleted breakwater until April 7, 1900, when, owing to the exhaustion of funds, its maintenance by the Engineer Department was discontinued. It has since been maintained by the Light-House Department.

PRESENT CONDITION OF IMPROVEMENT.

The breakwater is now 1,465 feet long, with 3 feet top width at a level of 4 feet above mean high water. It has settled in some places. The work contains about 80,580 tons of riprap.

At its present length the breakwater affords a shelter to vessels waiting for tide to enter Glencove Harbor, and also to local commerce at Glencove Dock.

The project is about one-half completed.

Glencove Harbor is in the collection district of New York. The nearest lighthouse is on Sands Point, about 4 miles west. Fort Schuyler, New York Harbor, is the nearest work of defense.

Money statement.

July 1, 1899, balance unexpended	$164.06
June 30, 1900, amount expended during fiscal year	164.06
Amount (estimated) required for completion of existing project	72,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	10,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations for improving Glencove Harbor, New York, have been made as follows:

Application.	Date.	Amount.
Breakwater construction	Aug. 11, 1888	$20,000
Do	Sept. 19, 1890	15,000
Do	July 13, 1892	10,000
Do	Aug. 18, 1894	10,000
Do	June 3, 1896	8,000
Total		63,000

No contract for this improvement has been in force during the fiscal year ending June 30, 1900.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

It has been reported that the commerce for the calendar year 1899 was about the same as that for 1897, which was as follows:

Arrivals and departures of vessels.

[Draft, 4½ to 7½ feet; tonnage, 20 to 330 tons.]

Kind of vessel.	Number of round trips.	Aggregate tonnage of all trips.
Steamers, steam tugs, and yachts	1,855	277,405
Sailing vessels	175	29,750
Barges	624	93,600
Total	2,654	400,755

Freight received and shipped by water.

Chief articles.	Tons.	Estimated value.
Receipts:		
Coal	15,000	$60,000
Corn	50,400	720,000
Building materials, lumber, barrels, etc	150,000	105,000
Miscellaneous	185,000	1,447,000
Total	....	2,332,000
Shipments:		
Starch, glucose, etc	165,000	2,698,000
Miscellaneous	168,000	1,269,000
Total	....	3,967,000
Total receipts and shipments	733,400	6,299,000

No new lines of transportation are reported as established since July 1, 1899.

F 10.

IMPROVEMENT OF FLUSHING BAY, NEW YORK.

Flushing Bay is on the north shore of Long Island, about 14 miles by water from the Battery, New York City.

PROJECT FOR IMPROVEMENT.

In 1879 a project for this improvement was adopted, which, as since modified, consists in building a dike 4,663 feet long on the west side of the channel and in making and maintaining a channel 6 feet deep at mean low water up to the lower bridge at Flushing, at an estimated cost of $173,500.

Further details in reference to the project may be found on page 1106, Annual Report of the Chief of Engineers for 1897.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

No work was done.

PRESENT CONDITION OF IMPROVEMENT.

The dike, 4,663 feet long, is in poor condition. The outer part, 1,606 feet long, which was left partly completed in 1891, has since been nearly destroyed by storms and ice. Further work upon the dike being discontinued, owing to the strong opposition of property owners along the shores of the bay (see Annual Report of the Chief of Engineers for 1892, p. 723), it is not proposed to repair the structure. A small light at the outer (north) end of the dike, maintained by the Light-House Department, prevents that work in its present condition being a serious menace to local navigation.

At completion of last contract, in May, 1897, the channel up to Flushing was in good condition, with an available depth of 6 feet or over at mean low water.

No shoaling has been reported during the year.

Flushing Bay is in the collection district of New York. The nearest light-house is on North Brother Island, 3 miles to the northwest. There is a small light on the north end of the dike, in the bay, maintained by the Light-House Department. Fort Schuyler and Willets Point, about 4 miles east from the mouth of the bay, are the nearest works of defense.

Money statement.

July 1, 1899, balance unexpended		$504.47
July 1, 1900, balance unexpended		504.47
Amount (estimated) required for completion of existing project		50,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$50,500.00	
For maintenance of improvement	5,000.00	
		55,500.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations for improving Flushing Bay, New York, have been made as follows:

Application.	Date.	Amount.
Construction of dike	Mar. 3, 1879	$20,000
Dredging	June 14, 1880	15,000
Do	Mar. 3, 1881	10,000
Do	Aug. 2, 1882	5,000
Do	July 5, 1884	10,000
Do	Aug. 5, 1886	10,000
Construction of dike and dredging	Aug. 11, 1888	15,000
Repair of dike and dredging	Sept. 19, 1890	20,000
Dredging	July 13, 1892	10,000
Do	Aug. 18, 1894	4,000
Do	June 3, 1896	4,000
Total		123,000

No contract for this improvement has been in force during the past fiscal year.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through courtesy of L. Boyer's Sons, 90 Wall street, New York City.]

Freight received and shipped by water.

Articles.	Tons.	Estimated value.
Receipts:		
Coal	33,700	$141,540
Building materials	12,670	63,525
Paving materials	66,210	82,522
Farm produce	20,000	57,250
Dyewoods	8,800	264,000
Miscellaneous	12,800	136,100
Shipments:		
Logwood extracts	3,575	715,000
Miscellaneous	1,000	75,000
Total	158,755	1,534,937

Vessels engaged in above commerce.

Class.	Number of round trips.	Tonnage.	Draft, loaded.
		Tons.	*Feet.*
Steamers	304	100 to 156	7 to 7½
Tugs	1,022		
Sail vessels	157	150 to 450	6 to 14
Barges, etc	320	100 to 700	6 to 10
Total	1,803		

No new lines of transportation are reported as established since July 1, 1899.

F II.

IMPROVEMENT OF EAST RIVER AND HELL GATE, NEW YORK.

East River is the designation of the tidal strait which extends from the Battery to Throgs Neck, a distance of 16 miles, and connects New York Harbor with Long Island Sound. It is the harbor entrance used almost exclusively by the coasting trade between New York City and the New England States and British American provinces.

The channel in places is crooked and narrow, and was originally obstructed by many rocks and reefs, over and around which the tide ran in strong eddying currents, with velocities at times as high as 6 miles per hour; even 10 miles has been recorded at single points. The most dangerous of these places is that known as Hell Gate, where the channel turns a right angle around Hallets Point, and where it was originally obstructed by several reefs, some bare at low tide and others covered from 1 to 20 feet deep.

The mean rise of tide in East River below (south of) Hell Gate is 4½ to 5 feet; east of Hell Gate, where it is affected by the Long Island Sound tides, it is from 5 to 7 feet.

PROJECTS FOR IMPROVEMENT.

The project for improvement, adopted in 1867 and subsequently modified, provides for removal to depths of from 18 to 26 feet at mean low water of many of the most dangerous reefs in and near Hell Gate and at other points in the river, as shown in the table descriptive of the condition of the improvement; also for the building of four sea walls upon other ledges to guide the course of the tidal currents. The total estimated cost to date is $5,639,120.

Further detailed descriptions of the locality, projected work, and work done are printed in the Annual Reports of the Chief of Engineers—

	Page.
For 1868	741
For 1874, Part II	164
For 1897	1026

Modifications in harbor lines on the north shore of East River between Oak Point and Bronx River, and on the west shore of East River between East Thirty-seventh and East Thirty-eighth streets, were approved by the Secretary of War on April 14 and May 17, 1900, respectively.

PERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Plant laid up and cared for at Mill Rock.

At the beginning of the fiscal year, under the river and harbor act of March 3, 1899, and in pursuance of the project approved for expenditure of funds, a contract with the R. G. Packard Company for the removal of Man-o'-War Rock for the sum of $159,000 had been prepared and forwarded for approval. The contract was approved on July 13, 1899, but owing to time consumed in preparation of contractor's plant work was not commenced on the removal of the rock until about the 1st of January, 1900. Work has been in operation since that date. The work done during the year has consisted in drilling and blasting on the northeast quarter of the rock; 162 holes have been drilled and 2,692 pounds of powder used; no rock was removed. On July 1, 1900, the removal of the rock will be commenced.

An examination on Middle Reef extending from December 27, 1899, to January 9, 1900, was made for the purpose of finding obstructions reported by the Maine Steamship Company on an area supposed to have a least depth of 18 feet. Fifteen projecting pieces of rock, aggregating 38 gross tons, and a 2,000-pound anchor were found, and under authority of the Chief of Engineers, dated January 16, 1900, they were removed in January, to make a clear depth of 18 feet or over at mean low water, or a depth corresponding to the rest of the bottom on Flood Rock. This work was done by the United States plant and a hired tug, at a cost of about $1,224. In May, 1900, examinations were made of two reefs having but 16 feet over them at mean low water; one is located off Twenty-sixth street, and the other off Third street, borough of Manhattan. A project for the removal of these reefs to 26 and 19 foot depths, respectively, was approved by the Secretary of War June 14, 1900. Specifications have been prepared and forwarded for approval.

In accordance with the terms of the river and harbor act of March 3, 1899, a survey of Diamond Reef and Coenties Reef, following preliminary examination reported April 22, 1899, was made during the period between September 11 and December 2, 1899. A report on same, with map, is published as House Doc. No. 495, 56th Congress, first session.

PRESENT CONDITION OF IMPROVEMENT.

The following table shows the rocks and reefs to be removed under the adopted project, with their distance from the Battery, and the original, present, and projected depths for each:

Name of locality.	Distance from the Battery.	Least original depth, mean low water.	Least depth, mean low water, June 30, 1900.	Projected depth.	Remarks.
	Miles.	*Feet.*	*Feet.*	*Feet.*	
Diamond Reef	½	17	26	24	Completed.
Reef off Diamond Reef	½	19	26	26	Do.
Coenties Reef	½	14.3	25.5	24	Do.
Rock off Third street	3	15.9	15.9	19	Work not commenced.
Shell Reef, off Ninth street	3½	7.5	*a* 18	18	
Pilgrim Rock, off Nineteenth street	4	12	24	24	Completed.
Rock off Twenty-sixth street	4¼	16.1	16.1	26	Work not commenced.
Ferry Reef, off Thirty-fourth street	4½	7	24	26	
Charlotte Rock, off Thirty fourth street	4½	14.7	26.5	26	Completed.
Man-o'-War Rock	4¾	+ .8	+ .8	26	Under contract.
Middle Reef, including Flood Rock, Gridiron, Hen and Chickens, and Negro Heads.	7	+ 6	18 to 20	26	
Hallets Point	7½	+4	26	26	Completed.
Heel Tap	7½	12.1	20.5	26	
Frying Pan	7½	11	18	26	
Pot Rock	7½	20	22.8	26	
Way Reef	7½	17.4	26	26	Do.
Shell Drake	7½	18.3	26	26	Do.
Scaly Rock	7½	....	26	26	Do.
Negro Point	7½	....	....	26	
Reef off Sunken Meadow	9	11	17.8	18	Nearly completed.
North Brother Island Reef	10	16	26	26	Completed.
Reef off Baretto Point	11	17	24	24	Do.

a Nearly.

The depth proposed in the original project was 24 feet below mean low water. Subsequently the projected depth was increased to 26 feet for all the rocks in and near Hell Gate and for some of the others.

Shell Reef and reef off Sunken Meadow are large reefs not directly in the main channel. When the project was extended to include work upon these their proposed depth was placed at 18 feet.

PROPOSED OPERATIONS.

With the available funds it is proposed to remove Man-o'-War Rock to a depth of 26 feet below mean low water, and other rocky obstructions included in the approved project.

Money statement.

July 1, 1899, balance unexpended	$248,099.09
June 30, 1900, amount expended during fiscal year	8,723.27
July 1, 1900, balance unexpended	239,375.82
July 1, 1900, amount covered by uncompleted contracts	159,000.00
July 1, 1900, balance available	80,375.82
Amount (estimated) required for completion of existing project	1,003,840.67
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	300,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

Act of—		Act of—	
July 25, 1868	$85,000.00	August 2, 1882	$200,000.00
April 10, 1869	178,300.00	July 5, 1884	360,000.00
July 11, 1870	250,000.00	August 5, 1886	112,500.00
March 3, 1871	250,000.00	August 11, 1888	250,000.00
June 10, 1872	225,000.00	September 19, 1890	200,000.00
March 3, 1873	225,000.00	July 13, 1892	150,000.00
June 23, 1874	225,000.00	August 18, 1894	75,000.00
March 3, 1875	250,000.00	June 3, 1896	60,000.00
August 14, 1876	250,000.00	March 3, 1899	250,000.00
June 18, 1878	350,000.00	Net receipts from other sources	3,637.88
March 3, 1879	250,000.00		
June 14, 1880	200,000.00	Total	4,649,437.88
March 3, 1881	200,000.00		
May 4, 1882	50,000.00		

Deduct amount reverted to United States Treasury	$3,158.55	
Deduct amount allotted to Harlem River	11,000.00	
		14,158.55
		4,635,279.33
Amount expended to June 30, 1900		4,395,903.51

CONTRACT IN FORCE.

Name of contractor: R. G. Packard Co.
Date of contract: June 21, 1899.
Date of approval: July 13, 1899.
Date of commencement: On or before September 11, 1899.
Date of completion: On or before March 11, 1901.
Excavation and removal of Man-o'-War Rock to a depth of 26 feet below mean low water.

COMMERCIAL STATISTICS.

The commerce of the East River is so intimately connected with that belonging to New York Harbor proper that it is impracticable to make a separate statement of it.

F 12.

IMPROVEMENT OF HARLEM RIVER, NEW YORK.

Harlem River and Spuyten Duyvil Creek, branches of East River and Hudson River, respectively, originally joined at Kings Bridge and separated Manhattan Island from the mainland to the north.

The Harlem River had a natural fair channel 10 feet deep at low water from the East River, near Hell Gate, to Morris Dock, a distance of 5 miles, except at High Bridge, where the depth was reduced to 6 feet by the débris of stone, etc., carried into the river during the construction of the bridge; for a mile farther, to Fordham Landing, it had a crooked channel of 7 feet depth; above Fordham Landing to Kings Bridge, a further distance of about a mile, the channel was too narrow and crooked to be used by any but the smallest class of boats. From Kings Bridge to the Hudson River, a distance of 1¾ miles, Spuyten

Duyvil Creek had a natural available depth of about 4 feet at low water. At Kings Bridge the channel was very narrow and nearly cut off by a ledge of rocks, awash at low tide.

The mean rise of tide in the Harlem River was from 5.5 to 6 feet; in Spuyten Duyvil Creek it was 3.8 feet. Mean high-water level in the Hudson River at Spuyten Duyvil Creek was nearly a foot lower and one hour and forty minutes earlier than in the Harlem River.

PROJECT FOR IMPROVEMENT.

This project, adopted in 1875 and subsequently modified, consists in making a navigable channel between the East and Hudson rivers by way of Harlem River and Spuyten Duyvil Creek, cutting off the sharp bend at Kings Bridge by a canal through Dyckman Meadow, the width of channel to be 350 to 400 feet, and the depth at mean low water to be 15 feet, except through Dyckman Meadow rock cut, where it was to be 18 feet, the work to be done by rock removal and dredging, and the sides of channel to be protected in places by diking or revetment. The estimated cost is $2,700,000.

Further detailed descriptions of the locality and projects are printed in the Annual Report of the Chief of Engineers for 1875, Part II, page 224, and for 1887, Part I, page 665.

Harbor lines for Harlem River and Spuyten Duyvil Creek were established by the Secretary of War October 18, 1890, and modified October 2, 1893, and again January 8, 1897.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

At the beginning of the year, under the appropriation of $100,000 made by the river and harbor act of March 3, 1899, a contract with John P. Conkling, dated May 18, 1899, and expiring June 11, 1900, for the removal of 235,000 cubic yards of stone stored on land near Spuyten Duyvil, New York City, was in force and work was in progress; 396 cubic yards of stone had been removed. During the fiscal year work under this contract was continued until November 25, at which time it was suspended owing to a strike of the contractor's men. Up to that time the contractor removed, from July 1, 1899, 11,097 cubic yards of stone, making the total amount removed under the contract 11,493 cubic yards.

In December the owners of the land on which the stone is stored commenced proceedings to dispossess the United States from occupancy of same. Arrangements for renewing the lease were made, and under date of February 27, 1900, the contractor was notified to resume work. Owing to his failure to do so, the annulment of the contract was recommended under date of April 9, 1900, and under date of May 3, 1900, by authority of the Secretary of War, it was annulled. A proposition for the relief of the United States from all obligations in regard to the stone by paying the Dyckman estate (the owners of the land) the sum of $75,000 is now under consideration.

Under a project approved October 11, 1899, for the expenditure of a part of the appropriation of March 3, 1899, in dredging, a contract dated December 11 was entered into with P. Sanford Ross, incorporated, for the removal of 150,000 cubic yards of material, at 10.4 cents per cubic yard, from the mouth of Spuyten Duyvil Creek. This dredging was made necessary owing to the construction of a new drawbridge at the junction of Spuyten Duyvil Creek and Hudson River. Dredging under this contract was commenced on March 20 and continued to June 4, during which time 132,174 cubic yards of material were removed, and resulted in increasing the width of the channel to 400 feet and making it conform to the new location of the bridge; the depth made was 15 feet at mean low water. The new bridge is not completed, and a temporary trestle built for the New York Central and Hudson River Railroad Company is still in use. After the bridge has been opened and the temporary trestle has been removed more dredging may be required, and if so it will be done under the pending contract.

PRESENT CONDITION OF IMPROVEMENT.

From the Hudson River to Macombs Dam Bridge the improved channel is 12 feet deep and over at mean low water, and from 180 to 350 feet wide; at and near the Hudson River it is 400 feet wide. The cut through Dyckman Meadow, originally excavated to a depth of 18 feet mean low water, has shoaled to 15 feet in some places owing to the deposit of silt; the width of the cut is 350 feet. From Macombs Dam Bridge south to Wards Island, East River, the available channel is 15 feet deep and over and nowhere less than 150 feet wide.

To complete the project there remains the widening of the channel to the full width of 350 to 400 feet, deepening it to 15 feet where that depth has not already been obtained, and revetting the banks where the channel excavation passes through meadow or upland.

PROPOSED OPERATIONS.

It is proposed to apply the present appropriation, first, to the removal of stone from Dyckmans Meadows, or to making a settlement with the executors of the Dyckman estate to release the United States from all obligations on account of the unused stone; and, second, to the prosecution of further dredging at the mouth of Spuyten Duyvil Creek should it be required when the new bridge is completed.

Money statement.

July 1, 1899, balance unexpended		$103,014.62
June 30, 1900, amount expended during fiscal year		18,977.31
July 1, 1900, balance unexpended		84,037.31
July 1, 1900, outstanding liabilities	$2,497.42	
July 1, 1900, amount covered by uncompleted contracts	1,853.90	
		4,351.32
July 1, 1900, balance available		79,685.99
Amount (estimated) required for completion of existing project		1,455,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		500,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

Allotment June 23, 1874, from appropriations for East and Harlem rivers	$11,000
Act of March 13, 1875	10,000
Total	21,000

Amounts appropriated under present project.

June 18, 1878	$300,000	August 18, 1894	$125,000
March 3, 1879	100,000	June 3, 1896	125,000
August 11, 1888	70,000	March 3, 1899	100,000
September 19, 1890	250,000		
July 13, 1892	175,000	Total	1,245,000

Abstract of proposals for dredging in Harlem River, New York, received in response to advertisement dated October 21, 1899, and opened November 27, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers.

No.	Name and address of bidder.	Price per cubic yard, scow measurement.	Amount on 150,000 cubic yards.
		Cents.	
1	Henry Du Bois Sons Company, 119 South street, New York City	$14\frac{9}{10}$	$22,350.00
2	Joseph Oliver Stokes, 80 and 82 Reade street, New York City	17	25,500.00
3	Morris & Cumings Dredging Co., 17 State street, New York City	$12\frac{9}{11}$	19,227.27
4	R. G. Packard, 130 Pearl street, New York City	$12\frac{2}{10}$	18,300.00
5	The W. H. Beard Dredging Co., 13 William Street, New York City	$12\frac{9}{10}$	19,350.00
a6	P. Sanford Ross, Incorporated, 277 Washington street, Jersey City, N. J	$10\frac{4}{10}$	15,600.00

a Lowest bid.

CONTRACT IN FORCE TO MAY 3, 1900.

Name of contractor: John P. Conkling.
Date of contract: May 18, 1899.
Date of approval: May 27, 1899.
Date of commencement: On or before June 17, 1899.
Date of completion: On or before June 11, 1900.
Removal of 235,000 cubic yards, more or less, of broken stone, at 22 cents per cubic yard.
Work was begun on June 17, 1899, and was suspended November 25, 1899.
Contract was annulled May 3, 1900.

CONTRACT AT PRESENT IN FORCE.

Name of contractor: P. Sanford Ross, Incorporated.
Date of contract: December 11, 1899.
Date of approval: December 26, 1899.
Date of commencement: March 20, 1900.
Date of completion: July 19, 1900.
Dredging 150,000 cubic yards, more or less, of material, at 10.4 cents per cubic yard, measured in scows.
Work was begun on March 20, 1900.

COMMERCIAL STATISTICS.

The commerce of the Harlem River is so intimately connected with that belonging to East River and New York Harbor that it is impracticable to make a separate statement of it, as no record is kept. During the years 1893 and 1895 a general statement of the commerce was obtained from data collected by the employees of this office engaged on the improvement. Since the latter date it has been impracticable to attempt a collection of statistics by the method referred to. The commerce of 1893 and 1895 was as follows:

Items.	1893 (tons).	1895.	
		Tons.	Value.
General merchandise	3,232,052	3,473,581	$171,803,633
Grain, flour, feed, etc	596,306	767,851	15,238,420
Lumber and timber	451,702	633,194	7,839,116
Building material	602,217	1,526,043	4,698,294
Fuel	878,234	947,710	3,776,483
Ice	149,865	185,215	351,430
Total	5,910,376	7,533,594	203,707,376

As near as can be determined, the vessels engaged in the river traffic were as follows:

Canal boats, barges, and railroad-car floats	37,246
Sailing vessels, schooners, lighters, etc	5,483
Steamers and tugs, exclusive of pleasure boats	27,525

The following information regarding the commerce on the Harlem River for the calendar year 1899 was furnished by the New York, New Haven and Hartford Railroad Company:

Freight handled at their Harlem River station.

	Tons.
Received:	
Coal	604,266
Grain, flour, feed, etc	725,140
General merchandise	2,322,138
Shipped:	
General merchandise	823,143
Total	4,474,687

Number of trips made by vessels engaged in above commerce.

Steamers	1,460
Tugs	17,801
Car floats	24,924
Outside lighters (estimated)	1,825
Total	46,010
Number of loaded cars	412,619
Number of empty cars	146,773

BRIDGES ACROSS THE HARLEM RIVER.

The following table shows the location and characteristics of the several existing bridges across the Harlem River:

Name and location of bridge.	Width in clear in each draw.	Height of bottom chords above mean high water.	Remarks.
	Feet.	*Feet.*	
First avenue	108	24	Double draw, highway bridge, iron, in course of construction.
Second avenue	103.7	28.5	Double draw, railroad bridge, iron.
Third avenue	108	24	Double draw, highway bridge, iron.
Fourth avenue	102	25.6	Double draw, railroad bridge, iron.
Madison avenue	132	25	Double draw, road bridge, iron.
Macombs Dam, One hundred and fifty-fifth street.	164	28	Do.
New York and Northern Railway Bridge, at Eighth avenue.	128	28	Double draw, railroad bridge, iron.
High Bridge (old aqueduct)	....	....	No draw; stone arch; width between piers, 77.7 feet; clear waterway, 55 feet; crown of arch, 100 feet above mean high water.
Washington Bridge, at One hundred and eighty-first street.	....	Single span.	No draw; iron arch; span 500 feet; clear waterway, 420 feet; crown of arch, 136.7 feet above mean high water.
Bridge at Broadway across improved channel.	104	26	Double draw, road bridge, iron; opened to traffic Jan. 1, 1895.
Bridge over Spuyten Duyvil Creek (temporary).	60	7.26	Lift opening, railroad bridge, iron.
Bridge over Spuyten Duyvil Creek (permanent).	100	[a]8.6	Double draw, railroad bridge, iron, in course of construction.

[a] Extreme high tide.

Under authority conferred by the river and harbor acts dated September 19, 1890, August 17, 1894, and June 3, 1896, rules and regulations for the opening and operating of the draws in the bridges crossing the Harlem River were prescribed by the Secretary of War May 14, 1898.

F 13.

IMPROVEMENT OF NEWTOWN CREEK, NEW YORK.

Newtown Creek is a tidal stream about 4 miles long, extending northerly and westerly through Brooklyn, N. Y., and emptying in the East River opposite Thirty-fourth street.

The mean rise of tide in the creek is about 4½ feet.

PROJECTS FOR IMPROVEMENT.

The first project for improvement, adopted in 1881 and subsequently extended, proposed a channel of varying widths and depths from the mouth of the creek up to the Metropolitan Avenue crossings in both the east and west branches.

By the terms of the river and harbor act of 1896 this project was modified so as to provide for a channel uniformly 125 feet wide and 18 feet deep at mean low water up to the Metropolitan Avenue bridges, at an estimated cost of $450,000.

Further details of previous projects are printed in the Annual Report of the Chief of Engineers for 1896, pages 760, 761.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Nothing in furtherance of the project has been done.

PRESENT CONDITION OF IMPROVEMENT.

The project is practically completed.

The channel has been dredged 18 feet deep at mean low water, except through the south drawspan of Vernon Avenue Bridge and the southwest drawspan of Greenpoint Avenue Bridge. It has been made 125 feet wide, except through the bridge drawspans and at certain points above Grand Street Bridge, where the established harbor lines are less than that distance apart. On account of the condition of Vernon Avenue Bridge it has not been safe to dredge in the drawspan. An order of the Secretary of War has been issued requiring alterations in Vernon Avenue Bridge.

At the following-named points the banks of the channel are bordered with flats of mud or loose sand, which run into the side cuts immediately after dredging:

At the entrance to the creek from East River.

Immediately below Greenpoint Avenue Bridge.

From Meeker Avenue Bridge to the junction of the east and west branches.

At these points to maintain the required depth over the full width of the channel frequent dredging is required and will be until bulkheads are built.

PROPOSED OPERATIONS.

The available funds will be applied to maintenance of the dredged channel, which will require widening at the entrance at East River.

The estimated cost of maintenance of the improved channel is $10,000 per year. It would be more effective to apply this as $20,000 every two years, and it is probable that the amount of shoaling will decrease as the loose material from adjacent flats is removed, reducing the cost of maintenance.

Newtown Creek is in the collection district of New York, of which New York City is the port of entry. The nearest light-house is on Blackwells Island, New York Harbor. The nearest work of defense is Fort Columbus, Governors Island, New York Harbor.

Money statement.

July 1, 1899, balance unexpended	$16,650.23
June 30, 1900, amount expended during fiscal year	964.62
July 1, 1900, balance unexpended	15,685.61
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	10,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	

Appropriations for Newtown Creek have been made as follows:

Application.	Date.	Amount.
Previous project:		
Dredging below Vernon avenue	June 14, 1880	$10,000
Do	Aug. 2, 1882	15,000
Dredging entrance to Metropolitan avenue	July 5, 1884	20,000
Do	Aug. 5, 1886	37,500
Do	Aug. 11, 1888	25,000
Dredging entrance to Metropolitan avenue and English Kills	Sept. 19, 1890	35,000
Dredging entrance to Metropolitan avenue	July 13, 1892	35,000
Do	Aug. 18, 1894	20,000
Present project:		
Dredging	June 3, 1896	30,000
Do	June 4, 1897	183,000
Total		410,500

COMMERCIAL STATISTICS.

It was not practicable to obtain reliable statistics for the calendar year 1899. The following statement, carefully compiled for the year 1897, is believed to represent fairly the annual commerce of the stream:

Freights received and shipped by water.

	Tons.	Estimated value.
Received	2,402,551	$29,596,218
Shipped	825,993	21,850,713
Total	3,228,544	51,446,931

This freight consists of coal, lumber, building materials, petroleum products, chemicals, and miscellaneous goods.

In addition there were about 420,000 tons of cellar excavations and street cleanings received for filling low lands.

Vessels engaged in above commerce.

Kind of vessel.	Number.	Draft, loaded.	Tonnage.
		Feet.	*Tons.*
Steamers, tugs not included	1,068	6 to 19	120 to 2,250
Sailing vessels	1,768	6 to 19	50 to 3,200
Barges, etc	12,628	6 to 12	100 to 600
Total	15,464		

The above record of freights received and shipped shows an increase of 488,062 tons over the figures reported for 1896.

No new lines of transportation are reported established since July 1, 1899.

F 14.

IMPROVEMENT OF WALLABOUT CHANNEL, NEW YORK.

Wallabout Channel consists of a waterway extending in a half-circle around the inside of the island known as Cob Dock, which lies in Wallabout Bay, off the United States navy-yard at Brooklyn, N. Y., and is a part of the United States property. Wallabout Channel connects with Wallabout Bay east and west of Cob Dock.

Wallabout Bay is a slight indentation of the East River at a point about opposite the navy-yard.

Wallabout Channel is separated into two parts, called the east and west channels, by a stone causeway which connects the mainland with Cob Dock. The east channel, which is about 2,000 feet long and from 250 to 350 feet wide, and had available depths of from 15 to 20 feet along the line of deepest water, diminishing to 5 feet along the sides, is the part now embraced in the approved project for improvement.

The mean range of tide is 4.5 feet.

PROJECT FOR IMPROVEMENT.

Under the terms of the river and harbor act of 1896 a preliminary examination of Wallabout Channel was made, the report upon which was printed in House Doc. No. 122, Fifty-fourth Congress, second session, and also in the Annual Report of the Chief of Engineers for 1897, page 1047. This report stated that Wallabout Channel is worthy of improvement by the General Government to the extent of increasing the depth of the east channel to 20 feet at mean low water from the entrance to the causeway, which was formerly timber, but is now replaced by stone.

By a joint resolution of Congress approved June 16, 1898, it was resolved:

> That the Secretary of War be, and he is hereby, authorized and directed to submit estimates for work on Wallabout Channel, New York, with a view to secure a depth of twenty feet and a width of three hundred feet at mean low water, from its entrance to the timber causeway, in accordance with the plans heretofore submitted, and that the Secretary of War be, and is hereby, requested to submit his opinion as to the advisability of the proposed improvement.

By letter of the Chief of Engineers, dated July 25, 1898, the duty of making the survey required for estimates was assigned to Maj. H. M. Adams, Corps of Engineers. The survey was made in July and August, 1898, and his report on same was printed in House Doc. No. 50, Fifty-fifth Congress, third session.

The cost of the work was estimated as follows:

Dredging 183,000 cubic yards of sand, mud, etc. (scow measurement), at 20 cents per yard	$36, 600
Supervision, etc., about 10 per cent	3, 400
Total	40, 000

The project, as stated in the report upon the survey, was duly approved, and it was adopted under the river and harbor act of March 3, 1899.

A sketch of Wallabout Channel was printed in House Doc. No. 50, Fifty-fifth Congress, third session.

No harbor lines have ever been established by the United States in Wallabout Channel.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under the appropriation of $40,000, made by the river and harbor act of March 3, 1899, for completing the improvement, the project for expenditure of which was approved by the Secretary of War March 20, 1899, at the close of the fiscal year ending June 30, 1899, dredging was in progress under a contract with John H. Fenner, dated May 10, and expiring December 29, 1899, for doing the required work at the rate of 9⅝ cents per cubic yard, measured in scows, and 31,809 cubic yards had been removed, and the dredging over one-quarter of the area to be improved had been completed.

During the fiscal year work was in operation from July 1, 1899, to January 24, 1900, upon which date the work was finished. One hundred and twenty-two thousand three hundred and eight cubic yards of mud, sand, gravel, and clay were removed, and the project was completed to the required depth of 20 feet at mean low water.

The contract was extended from December 29, 1899, to date of completion. The total amount of material removed under it was 154,117 cubic yards.

In addition to the above work, during the period between December 4 and 11, 1899, the U. S. dredge *Hell Gate*, of the United States plant at Mill Rock, East River, removed from Wallabout Channel 9 bowlders, aggregating 50 tons in weight, which had been uncovered by dredging. The largest bowlder weighed 28½ tons. The cost of this work was $366.36, being at the rate of $7.33 per ton.

PRESENT CONDITION OF IMPROVEMENT.

The dredged channel has been made 20 feet deep at mean low water, and has been completed in accordance with the project.

PROPOSED OPERATIONS.

It is proposed to maintain the improvement with the funds now available.

Wallabout Channel is in the collection district of New York. The nearest lighthouse is on Blackwells Island, East River, New York. The nearest work of defense is Fort Columbus, Governors Island, New York Harbor.

Money statement.

July 1, 1899, balance unexpended	$39,702.24
June 30, 1900, amount expended during fiscal year	17,875.93
July 1, 1900, balance unexpended	21,826.31

Appropriation for improving Wallabout Channel, New York, $40,000, by act of March 3, 1899.

CONTRACT IN FORCE.

Name of contractor: John H. Fenner.
Date of contract: May 10, 1899.
Date of approval, May 29, 1899.
Date of commencement: On or before June 28, 1899.
Date of completion: On or before December 27, 1899.
Time of completion extended to February 4, 1900.
Dredging 183,000 cubic yards, more or less, of material, at 9⅜ cents per cubic yard, measured in scows.
Work was begun on June 7, 1899, and completed January 24, 1900.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

Complete data have not been received, but from information at hand relating to part of the traffic it would appear that the commerce of Wallabout Channel has increased 10 per cent since 1898. The following is a statement of commerce for 1897, with the exception of amounts of lumber and produce received, which could not be ascertained:

	Tons.	Value.
Received	314,000	$15,086,000
Shipped	26,300	922,000
Total	340,300	16,008,000

The vessels carrying above freights were as follows:

Kind.	Number.	Draft loaded.	Tonnage (average).
		Feet.	
Steamers	29	18 to 27	1,420
Sail vessels	75	11 to 24	100 to 1,200
Barges, lighters, etc	608	6 to 18	200 to 2,260
Total	712		

No new lines of transportation are reported as established since July 1, 1899.

F 15.

IMPROVEMENT OF CANARSIE BAY, NEW YORK.

Canarsie Bay is the northwest part of Jamaica Bay, at and in front of Canarsie Landing.

PROJECT FOR IMPROVEMENT.

The project for this improvement, adopted in 1880 and subsequently modified, consists in making a channel from deep water in Jamaica Bay to Canarsie Landing, to be 6 feet deep at mean low water and from 100 to 150 feet wide, and to protect it by two parallel dikes near its outer end; also to make a channel 4 feet deep to connect Canarsie Landing with Island Channel, and a channel northeasterly to Gophel Channel 5 feet deep and 50 feet wide. The estimated cost is $88,000.

Further descriptions of the locality and the project for improvement are printed in the Annual Report of the Chief of Engineers for 1897, page 1114.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Sufficient funds were not available, and therefore no work was done.

PRESENT CONDITION OF IMPROVEMENT.

The two pile dikes built at the east entrance of the main channel to Canarsie Landing are in fair condition. The north dike is 1,058 feet long, 50 feet being a return at the east end. It is mainly of creosoted timber. The channel face, for a linear distance of 20 feet near the outer end, has been broken down by the ice and the stone filling released. The south dike is 820 feet long. It is not creosoted, and many of the piles are worm-eaten.

The stone filling in both dikes has settled considerably.

The channel dredged from Canarsie Landing to "Big Channel," in Jamaica Bay, which was made 125 to 150 feet wide and 6 feet deep at mean low water, and the channel northeastwardly to Gophel Channel, dredged 5 feet deep and about 50 feet wide, have shoaled about 2 feet in places. The channel southwestwardly from Canarsie Landing to Island Channel, dredged 4 feet deep, has shoaled to 3 feet depth or less.

Canarsie Bay is in the collection district of New York. The nearest light-house is on the west end of Coney Island, about 7 miles to the southwest. The nearest work of defense is Fort Hamilton, New York Harbor.

Money statement.

July 1, 1899, balance unexpended		[1] $527.77
June 30, 1900, amount expended during fiscal year		2.85
July 1, 1900, balance unexpended		524.92
Amount (estimated) required for completion of existing project		23,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$23,000.00	
For maintenance of improvement	5,000.00	
		28,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations for improving Canarsie Bay, New York, have been made as follows:

Application.	Date.	Amount.
Constructing north dike, about 1,000 feet	June 14, 1880	$10,000
Dredging east channel, repairing north dike with crib at east end	Mar. 3, 1881 Aug. 2, 1882	5,000 3,000
Dredging east channel, extending north dike 50 feet	July 5, 1884	5,000
Dredging east channel, building south dike 820 feet	Aug. 5, 1886	10,000
Dredging east and southwest channels	Aug. 11, 1888	10,000
Dredging east channel, repairs north dike	Sept. 19, 1890	5,000
Dredging east and southwest channels	July 13, 1892	5,000
Repairs of dike, dredging	Aug. 18, 1894	2,000
Dredging	June 3, 1896	10,000
Total		65,000

No contract for this work has been in force during the fiscal year ending June 30, 1900.

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[1] Erroneously given as $529.41 in Annual Report for 1899.

COMMERCIAL STATISTICS.

A statement of commerce for the year 1899 has been asked for, but not yet received.

For the year 1896 the reports showed a tonnage of 50,087 tons of freight, valued at $427,375.

No new lines of transportation are reported as established during the past fiscal year.

F 16.

IMPROVEMENT OF BROWNS CREEK, SAYVILLE, LONG ISLAND, NEW YORK.

Browns Creek is a small stream flowing midway between the villages of Sayville and Bayport, near the south shore of Long Island, and emptying into Great South Bay, about 11 miles northeast from Fire Island Inlet.

PROJECT FOR IMPROVEMENT.

In 1890 a project for improving Browns Creek was adopted, under which it was proposed to make a harbor where fishing boats can lie in rough weather, by widening and deepening the stream up to the highway bridge, a distance of 6,300 feet; making it 100 feet wide and 4 feet deep at mean low water, a distance of 4,800 feet above the entrance, with 2 feet greater depth at the entrance, a length of 1,500 feet, and to protect the entrance channel by jetties on either side, the west jetty to be 1,600 feet long and the east jetty 1,400 feet long.

Further description of the locality and project is printed in the Annual Report of the Chief of Engineers for 1897, pages 1111–1112.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Under the appropriation of $3,000 made by the act of Congress approved March 3, 1899, for continuing improvement and maintenance, proposals were opened on September 26, 1899, and a contract dated October 9, 1899, was entered into with Charles Vivian, of Islip, N. Y., for the removal of about 18,000 cubic yards of material, at 13¾ cents per cubic yard. Excavation under this contract was commenced on November 25, and the contract was completed on December 13, 1899.

The work done consisted in restoring the channel to project dimensions, a length of 2,000 feet, beginning at a point at the entrance opposite the ends of the jetties, and extending up the creek. The amount of material, mud and sand, credited to the contractor, was 15,727 cubic yards; it was deposited on the marsh lands on the east side of the creek. The work was done with a pumping plant. Some of the depths made were excessive, for which no credit was given the contractor.

PRESENT CONDITION OF IMPROVEMENT.

The west jetty is 492 feet long and the east jetty 438 feet long, both with top width of 3 feet at 1 foot above high water, and both partly covered at the shore end by accretion. They are in fair condition.

The dredged channel is 3,200 feet long, with depth of from 4 to 8 feet at mean low water and width of 100 feet. About 2,600 linear feet of the channel lies inside the shore line, and is frequently used for night and winter anchorage by small oyster boats. Private canals, aggregating 1,525 feet in length, have been dredged into the marsh on the east side of the creek for additional anchorage and for business purposes.

Browns Creek is in the collection district of New York. The nearest light-house is at Fire Island Inlet, about 11 miles southwest. The nearest work of defense is Fort Totten, N. Y., about 35 miles west.

Money statement.

July 1, 1899, balance unexpended		$3,000.00
June 30, 1900, amount expended during fiscal year		2,536.55
July 1, 1900, balance unexpended		463.45
Amount (estimated) required for completion of existing project		18,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$18,000.00	
For maintenance of improvement	2,500.00	
		20,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations for improving Browns Creek have been made as follows:

Application.	Date.	Amount.
Jetties and dredging	Sept. 19, 1890	$12,000
Dredging	July 13, 1892	5,000
Do	Aug. 18, 1894	4,000
Do	June 3, 1896	4,000
Do	Mar. 3, 1899	3,000
Total		28,000

Abstract of proposals for dredging in Browns Creek, Sayville, N. Y., received in response to advertisement dated August 26, 1899, and opened September 26, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers.

No.	Name and address of bidder.	Price per cubic yard (prism measurement.)	Amount of material that can be removed under available balance—$2,500.
		Cents.	*Cubic yards.*
a1	Charles Vivian, Islip, N. Y	13¾	18,100
2	Joseph Leek and John B. Field, Islip, N. Y	15½	16,100

a Lowest bid.

CONTRACT IN FORCE.

Name of contractor: Charles Vivian.
Date of contract: October 9, 1899.
Date of approval: October 24, 1899.
Date of commencement: November 13, 1899.
Date of completion: January 12, 1900.
Dredging 18,000 cubic yards, more or less, of material, at 13¾ cents per cubic yard.
Work was begun November 25, 1899, and was completed December 13, 1899.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through courtesy of Mr. Joseph Wood, Sayville, N. Y.]

Freight received and shipped.

Articles.	Tons.	Estimated value.
Received:		
Coal, brick, lumber, etc	2,500	$15,800
Oysters received by water and shipped by rail	6,500	175,500
Fish	500	1,250
Clams	330	6,600
Shipped:		
Oysters	1,500	45,000
Clams	300	6,000
Fish	12	1,200
Total	11,642	251,350

Vessels engaged in above commerce.

Class.	Number.	Round trips.	Tonnage.	Draft (loaded.) *Feet.*
Steamers	2	900	10 to 15	3 to 5
Sail vessels	210		2½ to 60	2 to 6
Barges, etc	15		5 to 20	1 to 2
Total	227	900		

The amount of freight reported above is 942 tons more than reported for 1898.
No new lines of transportation are reported as established since July 1, 1899.

F 17.

IMPROVEMENT OF PATCHOGUE RIVER, NEW YORK.

This is a small tidal stream on the south side of Long Island, emptying into Great South Bay near its eastern end, about 55 miles east, in a direct line from New York City.

PROJECT FOR IMPROVEMENT.

In 1890 a project for improving this stream was adopted which contemplated dredging a channel 60 feet wide and 6 feet deep at mean low water from Great South Bay to the head of navigation, a distance of about 5,000 feet, and protecting the entrance channel from westerly storms by a jetty 1,700 feet long, at a total estimated cost of $40,000.

Further details of the river and the projected work are printed in the Annual Report of the Chief of Engineers for 1897, page 1108.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

No work in furtherance of the project was done.

A preliminary examination and survey with a view of an enlarged project for the improvement was made during the year. Reports on same, with maps, are published as House Doc. No. 171, Fifty-sixth Congress, first session.

PRESENT CONDITION OF IMPROVEMENT.

The jetty has been made 1,700 feet long.

The channel has been dredged 60 feet wide and 6 feet deep at mean low water from Great South Bay to 80 feet from the harbor lines at the head of the harbor. At the upper part, for 300 feet length, it was made 100 feet wide to allow vessels to turn about, and parts of the channel have been widened by private parties.

The project is considered completed, but maintenance work is required. Shoaling to the extent of from 1 to 2 feet in the channel near the shore ends of the jetties has been reported.

PROPOSED OPERATIONS.

The available funds will be used for the maintenance of the dredged channel.

Patchogue River is in the collection district of New York. The nearest light-house is at Fire Island Inlet, 14 miles southwest. The nearest work of defense is Fort Schuyler, Throgs Neck, distant 38 miles.

Money statement.

July 1, 1899, balance unexpended	$706.85
July 1, 1900, balance unexpended	706.85
Amount that can be profitably expended in fiscal year ending June 30, 1902, for maintenance of improvement, in addition to the balance available July 1, 1900	5,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations for improving Patchogue River, New York, have been made as follows:

Application.	Date.	Amount.
Constructing jetty and dredging	Sept. 19, 1890	$15,000
Dredging	July 13, 1892	8,000
Dredging and jetty	Aug. 18, 1894	4,000
Do	June 3, 1896	13,000
Total		40,000

No contract for this improvement has been in force during the past fiscal year.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

[Through courtesy of E. Bailey & Sons, Patchogue, N. Y.]

Freight received and shipped by water.

Articles.	Tons.	Estimated value.
Received:		
Coal	13,500	$67,500
Lumber	160,000	1,900,000
Miscellaneous	26,000	156,000
Shipped:		
Lumber	53,500	1,400,000
Fish and shellfish	5,300	160,000
Miscellaneous	8,500	125,000
Total	266,800	3,808,500

Vessels engaged in above commerce.

[Draft, 2 to 9 feet; tonnage, 8 to 350 tons.]

Class.	Round trips.	Aggregate tonnage of all trips.
		Tons.
Steamers	1,350	78,000
Sailing vessels	7,600	100,000
Barges	4,600	170,000
Total	13,550	348,000

Vessels built and repaired, 1899.

	Number.	Tonnage.
		Tons.
Vessels built	55	2 to 70
Vessels repaired	450	2 to 300

The above figures show an increase in freight over the amount reported for 1898 of 11,600 tons.

No new lines of transportation are reported as established since July 1, 1899.

F 18.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

WRECK OF SCHOONER "RICHARD HALL" IN LONG ISLAND SOUND OFF PORT CHESTER HARBOR, NEW YORK.

This vessel, a two-masted schooner, was sunk October 1, 1898, off Port Chester Harbor, in 40 feet of water, about 1¼ miles S. ½ W. from Blue Fish Shoal, Long Island Sound, both masts being visible.

The wreck formed a serious obstruction to navigation, and an allotment of $500 was made for the purpose of removing the dangerous parts of the derelict.

Proposals were invited for the removal of the wreck to a clear depth of 25 feet below mean low water. Nine bids were received, and the lowest, for $150, presented by the Merritt and Chapman Derrick and Wrecking Company, was accepted.

The wreck was partly removed during the month of December, 1898. Subsequent examinations showed that a full depth of 25 feet below mean low water had not yet been obtained and that parts of the wreck were still 4 feet above that plane.

The contractors were requested to remove the obstruction to the required depth, but the work has not yet been completed; arrangements for its completion are in progress.

WRECK OF CANAL BOAT "GETTYSBURG" IN HARLEM RIVER, NEW YORK.

This canal boat was found lying in the Harlem River near the foot of Park avenue, Mott Haven, New York City, and was considered a menace to the navigation of this waterway. A report recommending its removal was submitted to the Chief of Engineers, July 6, 1899, and on July 10, 1899, an allotment of $300 was made for doing the work.

Proposals were invited for removal of the wreck, and the bid of the R. G. Packard Company to do the work for the sum of $243 was accepted.

The wreck was completely removed in July, 1899.

WRECK OF CANAL BOAT IN EAST RIVER, NEW YORK.

This wreck was discovered in March, 1900, lying in the East River, New York, off dock front between Fortieth and Forty-first streets, borough of Manhattan, New York City, and was considered an obstruction to navigation.

On April 18, 1900, a report was submitted to the Chief of Engineers recommending its removal, and on April 23, 1900, an allotment of $800 was made for removing the obstruction.

Proposals were invited for removal of the wreck. Only one bid was received, which was rejected as being too high, and authority was given to readvertise the work, but in view of a probable extension of the harbor lines at the locality in question, which would include the area within which the wreck lies, it was decided to let the matter drop, as after the said harbor lines were extended the wreck would then be no longer a menace to navigation interests.

Abstract of proposals for removal of wreck of wooden hulk, East River, New York, received in response to advertisement dated May 3, 1900, and opened June 4, 1900, by Maj. E. H. Ruffner, Corps of Engineers.

No.	Name and address of bidder.	Amount.
1	R. G. Packard, 130 Pearl street, New York City	$640

F 19.

PRELIMINARY EXAMINATION OF PORT CHESTER HARBOR, NEW YORK.

[Printed in House Doc. No. 59, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, November 20, 1899.

SIR: I have the honor to submit the accompanying copy of report, dated September 13, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers, of a preliminary examination of Port Chester Harbor, New York, made to comply with provisions of the river and harbor act approved March 3, 1899.

This harbor is now under improvement by the United States, and it is believed that the funds now available will be sufficient to complete all work contemplated or desired by the various parties in interest. It is the opinion, therefore, of the local officer, concurred in by me, that the locality is not worthy of any further improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF LIEUT. COL. W. H. H. BENYAURD, CORPS OF ENGINEERS.

Engineer Office, United States Army,
New York, N. Y., September 13, 1899.

General: I have the honor to submit the following report upon a preliminary examination of Port Chester Harbor, New York, made pursuant to the requirements of the river and harbor act of March 3, 1899.

Port Chester Harbor is on the boundary line between the States of New York and Connecticut. It consists of the tidal part of Byram River and of a bay at its mouth.

In 1872 a project for improvement was adopted, which, as subsequently modified, consists in removing Salt Rock to 9 feet below mean low water, building a breakwater from Sunken Rock to Byram Point, and dredging to make and maintain a channel to the Port Chester wharves, at a total cost of $57,000. Previous to the passage of the river and harbor act of March 3, 1899, $52,000 had been appropriated for this improvement, and all it required for completion was some dredging in the upper harbor.

By the terms of the act above referred to the sum of $25,000 was appropriated for "improving Port Chester Harbor, New York," "to be expended in enlarging the channel below and up to Town Dock to a depth of twelve feet and a width of seventy feet, and from Town Dock to the steamboat dock to a depth of nine feet, and a width of sixty feet."

A contract has been entered into with the Newburg Dredging Company for the execution of the work called for by the above act of Congress.

It is believed that the funds now made available will be sufficient to complete all work contemplated or desired by the various parties in interest, and therefore no recommendation is made for a continuation of operations, as it is believed that this harbor is at present not worthy of any further improvement.

Very respectfully, your obedient servant,

W. H. H. Benyaurd,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

F 20.

EXAMINATION AND PLAN AND ESTIMATE FOR IMPROVEMENT OF NEW ROCHELLE HARBOR AND ECHO BAY, NEW YORK.

[Printed in House Doc. No. 235, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 19, 1899.

Sir: The river and harbor act of March 3, 1899, provides for a preliminary examination or survey of New Rochelle Harbor, New York, and I have now the honor to submit the accompanying copies of reports dated September 16 and December 9, 1899, respectively, with map,[1] by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers, upon the subject.

This harbor is divided into two parts, a mile distant one from the other, one being called *New Rochelle Harbor* and the other *Echo Bay, New Rochelle*, both localities having heretofore been improved by the United States.

In his report upon the preliminary examination Colonel Benyaurd expressed the opinion that the locality known as *New Rochelle Harbor* is not now worthy of further improvement by the General Government, but that the portion known as *Echo Bay* is worthy of improvement to the extent of removing the remainder of Sheepshead Reef and of Start Rock as provided for in the original estimate, referred to more fully in said report. He is further of opinion that the removal of Long Rock to 6 feet depth at mean low water, and to increase the dimensions of the channel already dredged to the head of the harbor, so as to make it 6 feet deep at mean low water and 100 feet wide, both of which appear to be among the improvements desired by the local interests, are not worthy of being undertaken.

A survey in the ordinary sense not being required, the local officer was, by authority of the Secretary of War, directed to prepare and submit a plan and estimate of cost of the proposed improvement.

The work contemplated is the completion of that commenced in 1878 and suspended in 1883, namely, the removal of Start Rock to 7 feet depth and of Sheepshead Reef to 9 feet depth. The total estimated cost of all work now proposed is $17,000, based upon current prices, and includes the removal of certain scattering parts of Sheepshead Reef (one of them called Devoes Rock) not included in the original estimate, and the removal of a few projecting points remaining on Start Rock.

It is the opinion of Colonel Benyaurd that Echo Bay, New Rochelle Harbor, is worthy of improvement by the United States in the manner and to the extent set forth by him.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

HON. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF NEW ROCHELLE HARBOR, AND OF ECHO BAY, NEW ROCHELLE HARBOR, NEW YORK.

ENGINEER OFFICE, UNITED STATES ARMY,
New York, N. Y., September 16, 1899.

GENERAL: I have the honor to submit the following report upon a preliminary examination of New Rochelle Harbor, New York, made pursuant to the requirements of the river and harbor act of March 3, 1899:

The town of New Rochelle is situated on Long Island Sound about 1 mile north of the north boundary of the borough of Bronx, New York City, and about 22 miles by water from the Battery, New York.

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[1] Not reprinted. Printed in House Doc. No. 235, Fifty-sixth Congress, first session.

The harbor is divided into two parts, distant one from the other 1 mile; one is called New Rochelle Harbor and the other Echo Bay, New Rochelle.

New Rochelle Harbor consists of rather narrow and circuitous passages between several rocky islands and reefs, which shelter it from rough water. The original depth of the main channel in this harbor was from 8 to 9 feet at mean low tide. Glen Island, a popular summer resort for excursion and picnic parties, lies in the middle of this harbor. Between the harbor and Long Island Sound lies Davids Island, now occupied by Fort Slocum. The harbor affords shelter to a landing place for the steamer belonging to the Quartermaster's Department, United States Army, plying between the mainland and Fort Slocum, and for a few pleasure craft; no other statistics have been obtained.

A survey of the harbor was made in 1880, and the report upon same may be found in Annual Report Chief of Engineers for 1881, Part I, page 644; a project based upon it was submitted and approved. This project provided for the removal of certain rocks in the channel way, and channel dredging. In 1891, after $35,000 had been appropriated and expended upon this improvement, Col. D. C. Houston, in his annual report for 1891, Part I, page 804, Report of Chief of Engineers, 1891, states as follows:

> The project for improvement is practically completed, except the removal of Rock C. This does not now appear necessary, therefore no further work is now proposed.

In my opinion, this part of the harbor is not now worthy of further improvement by the General Government.

Echo Bay, New Rochelle, is used as the commercial harbor, and until the beginning of the improvement in New Rochelle Harbor in 1881 it was the port of the town of New Rochelle. It is landlocked except on the southeast, and has a good anchorage.

A survey was made in 1875, and a project based upon it was submitted December 20, 1875, and subsequently adopted, providing for the removal of two rocky reefs from the channel, viz:

1. Sheepshead Reef, lying midway between Echo Island and Duck Point, which had 1.6 feet of water upon it at low tide. This was to be removed to a depth of 9 feet at low water, which required the excavation of 872.5 cubic yards of rock, costing	$21,201.75
2. Start Rock, which projects about 2 feet above low water, and lies in the channel about 120 feet from Beauford Point. This was to be removed to 7 feet below low water, requiring the excavation of 370 cubic yards of rock, costing	12,672.50
Contingencies	5,081.13
Total	38,955.38

A depth of about 7 feet over Start Rock was obtained in January, 1880, and in 1881–1883 506 cubic yards were removed from the southern part of Sheepshead Reef, making 9 feet depth. In May, 1889, a petition of residents of New Rochelle was submitted, asking that the money then available—about $3,000, appropriated in 1882—be expended in dredging up to the wharves. This was approved by the Chief of Engineers, and the money was expended in making a channel 40 feet wide and 4 feet deep at mean low water, extending from Beauford Point to within 300 feet of the head of the harbor, a distance of about 1,050 feet.

Appropriations for improving this harbor have been made as follows:

Application.	Date.	Amount.
Removal of Start Rock	June 18, 1878	$10,000
Do	Mar. 3, 1879	3,000
Removal of Sheepshead Rock	June 14, 1880	3,000
Do	Mar. 3, 1881	3,000
Dredging	Aug. 2, 1882	3,000
Total		22,000

Nothing has been done since the dredging of 1889. The last mention of this work in Annual Report of the Chief of Engineers was in 1892, Part I, page 706, when Colonel Houston stated:

> To complete the project there yet remains the removal of the rest of Sheepshead Reef, which can be done with the balance of the original estimate not yet appropriated, $17,000, provided it be available at one time, and it is recommended, on the ground of economical expenditure, that if further appropriations be made for removal of rocks in this harbor not less than the estimated sum required be appropriated.

In compliance with the terms of the river and harbor act of August 18, 1894, a preliminary examination of New Rochelle Harbor was made, and a report was submitted by Col. Henry M. Robert, which was printed in Annual Report of the Chief of Engineers, 1895, Part I, page 869. No statistics of commerce in detail were then obtained, and further improvement to the harbor was not recommended.

The present preliminary examination has shown that the improvement desired for New Rochelle Harbor is the removal of the remainder of Sheepshead Rock to 9 feet depth; of some points remaining of Start Rock to 7 feet depth, and the removal of Long Rock, which is a large rock lying in the channel about 100 feet off from Beauford Point Dock. to 6 feet depth at mean low water, and the channel already dredged to the head of the harbor increased in dimensions enough to make it 6 feet deep at mean low water and 100 feet in width.

The town of New Rochelle was stated to me to have a population of 16,000, having increased about 10,000 during the past fifteen years, and its commerce by water has been correspondingly increased. There is a freight steamboat making daily trips to and from New York, and a number of sailing vessels and barges in tow, carrying freight, coal, lumber, and general merchandise.

Maps of the harbor were printed in Annual Reports of the Chief of Engineers for 1880, page 513, and 1886, page 654.

The present channel depth to the public dock at Beauford Point is about 7 feet, and the general harbor anchorage has depths ranging from 9 to 18 feet at mean low water. From Beauford Point to the head of the harbor the depth at low water is about 4 feet, the result of dredging by the United States, as previously stated, and dredging by private parties. The mean range of tides is about 7¼ feet.

In my opinion the part of New Rochelle Harbor known as Echo Bay is worthy of improvement by the General Government to the extent of removing the remainder of Sheepshead Reef and Start Rock, as provided for in the original estimate, at an estimated cost of $17,000.

The removal of Long Rock is not needed enough to justify the large expenditure of the amount required to remove it to a depth of 6 feet at mean low water, and the channel appears to be deep enough for the present commerce. No survey is necessary for the purpose of preparing plans and estimates of the desired improvement, the surveys already made affording all essential information.

Appended are letters and extracts from letters bearing upon the importance of the desired work.

Very respectfully, your obedient servant,

W. H. H. Benyaurd,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
September 20, 1899.

Respectfully submitted to the Secretary of War.

This is a report upon preliminary examination made of New Rochelle Harbor, New York, under the provisions of the river and harbor act of March 3, 1899.

This harbor is divided into two parts, distant a mile from each other, one being called New Rochelle Harbor and the other Echo Bay, New Rochelle. Both localities have heretofore been improved by the United States Government.

It appears that the improvement now desired is that of Echo Bay, by the removal of the remainder of Sheepshead Rock to 9 feet depth, of some points remaining of Start Rock to 7 feet depth, and of Long Rock to 6 feet depth at mean low water, and to increase the dimensions of the channel already dredged to the head of the harbor, so as to make it 6 feet deep at mean low water and 100 feet wide.

Lieutenant-Colonel Benyaurd is of opinion that the locality known as *New Rochelle Harbor* is not now worthy of further improvement by the General Government, but that the portion known as *Echo Bay* is worthy of improvement to the extent of removing the remainder of Sheepshead Reef and of Start Rock, as provided for in the original estimate (referred to more fully within). He is further of opinion that the removal of Long Rock is not of sufficient necessity to justify the large expenditure that would be required to obtain a depth of 6 feet at mean low water, and that the channel appears to be deep enough for present commerce.

I concur in the views of the local officer.

A survey in the ordinary sense is not required, and I recommend that I be authorized to direct the local officer to submit a plan and estimate of cost of proposed improvement, the preparation of which can be effected without cost to the Government.

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Second indorsement.]

War Department,
September 23, 1899.

Approved as recommended by the Chief of Engineers.

By order of the Secretary of War:

A. N. Thompson,
Acting Chief Clerk.

EXTRACT FROM LETTER OF MESSRS. H. H. TODD AND EUGENE LAMBDEN, OF NEW ROCHELLE, N. Y., DATED APRIL, 1899.

* * * * * * *

The amount of commerce coming into the city of New Rochelle through said harbor amounts to over $750,000 annually, divided as follows:

Coal, 14,000 tons	$60,000
Lumber, between 4,000,000 and 5,000,000 feet	100,000
Brick, lime, cement, stone, etc	40,000
Groceries, hardware, etc	150,000
Knickerbocker Press, books, paper, etc	150,000
Merchandise of different kinds	250,000
Total	750,000

This commerce comes from St. Johns, New Brunswick, to Jacksonville, Fla., in vessels ranging up to 300 tons and drawing from 5 to 12 feet of water.

The commerce of the city of New Rochelle is growing fast, and if certain obstructions in Echo Bay, known as New Rochelle Harbor, be removed, said commerce will be greatly increased, to the material benefit of our city.

The statement we have made is conservative and will run over in amount.

* * * * * * *

EXTRACT FROM LETTER OF MESSRS. EUGENE LAMBDEN AND HENRY H. TODD, OF NEW ROCHELLE, N. Y., DATED APRIL 24, 1899.

* * * * * * *

Our present commerce passing into said Echo Bay Harbor represents $500,000 annually, consisting of materials, viz:

Lumber	$150,000
Coal	60,000
Masons' materials	25,000
General merchandise	300,000

Were the harbor placed in a better condition through the removal of certain obstructions therein, the commerce of said harbor would be greatly increased, to the material benefit of our citizens and to the better security of commerce using said harbor.

Very respectfully submitted.

EUGENE LAMBDEN.
HENRY H. TODD.

(Indorsed) W. L. WARD.

LETTER OF MR. H. H. TODD, PRESIDENT OF THE NEW ROCHELLE BOARD OF TRADE, DATED AUGUST 30, 1899.

MY DEAR SIR: The inclosed letter has been forwarded to me, and, for our board of trade, I want to heartily indorse its contents, which is very conservative in its estimates.

Further, the fact of the obstruction in the middle of our harbor, known as Echo Bay Harbor, compels the yachts to anchor in the channel, to the great detriment and menace to commerce entering and leaving said harbor.

I sincerely hope that you will be able to have the matter placed in such a shape that we may have the obstructions removed and the harbor put in a condition that the population and commerce of our city warrant.

Anything that we can do to assist you in this matter will cheerfully be done, and you will certainly receive the thanks of our community.

Very respectfully, yours,

H. H. TODD, *President.*

LETTER OF MR. EUGENE LAMBDEN, COMMODORE NEW ROCHELLE YACHT CLUB, TO MR. H. H. TODD, PRESIDENT OF THE NEW ROCHELLE BOARD OF TRADE, DATED AUGUST 28, 1899.

DEAR SIR: As an officer of the New Rochelle Yacht Club, I have given the subject of Echo Bay Harbor a very great deal of consideration, particularly owing to the large fleet of boats frequenting our harbor, having counted on many occasions over 100 yachts of all descriptions anchored therein, and during the summer the average number of yachts anchored therein is over 60; this includes vessels of the schooner and sloop type as well as steam yachts of large dimensions.

The nearness of this harbor to New York City, and convenience of communication, together with its natural beauty, has a tendency to congest Echo Bay Harbor, as far as yachts are concerned, and any action on the part of your honorable body that will clearly bring to the attention of the Government needed improvement in the removal of obstructions in said harbor will be welcomed by every yachtsman who uses this harbor as a refuge in time of storm.

I am, very truly,

Eugene Lambden,
Commodore New Rochelle Yacht Club.

PLAN AND ESTIMATE OF COST OF IMPROVING ECHO BAY, NEW ROCHELLE HARBOR, NEW YORK.

Engineer Office, United States Army,
New York, N. Y., December 9, 1899.

General: In compliance with Department letter dated September 29, 1899, in regard to survey of New Rochelle Harbor, New York, I have the honor to submit the following report, with plan and estimate, prepared to comply with the terms of the river and harbor act approved March 3, 1899:

The part of the harbor now under consideration is Echo Bay, New Rochelle, which is the principal commercial waterway or port.

Since very complete surveys of this harbor were made in 1875 and 1879, upon which were based the estimates for removal of certain rocks, the completion of which is now recommended, no field work in addition to that done in the preliminary examination was considered necessary in connection with this report.

The map submitted herewith is copied principally from the original surveys, and shows the rocky obstructions and the area dredged in 1889 in connection with the improvement.

The original project for this improvement is fully described in my report upon preliminary examination, dated September 16, 1899.

The natural depths of water in Echo Bay, New Rochelle, from 6 to 18 feet at mean low water, have remained practically unchanged since the commencement of the improvement in 1878. Start Rock has been removed to about 7 feet depth and a part of Sheepshead Reef removed to about 9 feet depth at mean low water, and a channel 4 feet deep and 40 feet wide at mean low water has been dredged to the upper wharves.

The original estimate of the cost of the improvement was $38,955.38. The amount expended was $22,000, leaving the amount required for completion $16,955.38.

The following estimate is intended only to cover the completion of the improvement commenced in 1878 and suspended in 1883, viz, the removal of Start Rock to 7 feet depth and Sheepshead Reef to 9 feet depth. The estimate is revised to correspond with current prices, and to admit of the removal of certain scattering parts of Sheepshead Reef (one of them called Devoes Rock) not included in the original estimate, and the removal of a few projecting points which remain on Start Rock, but the cost of completion of the improvement is the same as in the original estimate.

Estimates.

Removing 1,100 cubic yards of rock, at $13 per cubic yard	$14,300
Contingencies	2,700
Total	17,000

This harbor is now used extensively as a harbor of refuge for yachts of all classes, and to some extent for freighting vessels, and the removal of Sheepshead Reef to the depth of the surrounding bottom is necessary to make the harbor safe for anchorage purposes. The following statistics show the increase of commerce and the extent to which the harbor is used for anchorage purposes:

Table of commercial statistics.

Year.	Tons of freight received.	Value.	Vessels arriving and departing.	Number of vessels frequently using harbor anchorage.
1883	30,000	$171,750	400	....
1886	38,900	744,075	626	....
1888	57,000	1,114,000	755	40
1889	86,000	1,290,000	820	60
1890	90,000	1,350,000	1,000	100
1898	(*a*)	750,000	(*a*)	100+

a Not furnished.

In view of the foregoing, I am of the opinion that Echo Bay, New Rochelle Harbor, is worthy of improvement by the United States in the manner and to the extent set forth.

Very respectfully, your obedient servant,

W. H. H. BENYAURD,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

F 21.

EXAMINATION AND PLAN AND ESTIMATE FOR IMPROVEMENT OF WESTCHESTER CREEK, NEW YORK.

[Printed in House Doc. No. 111, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 4, 1899.

SIR: I have the honor to submit the accompanying copy of reports of September 15, 1899, and November 28, 1899, with map,[1] by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers, on preliminary examination and survey, respectively, of Westchester Creek, New York, made in pursuance of requirements of the river and harbor act of March 3, 1899.

Lieutenant-Colonel Benyaurd considers the locality to be worthy of improvement by the General Government, and presents a plan for dredging a channel in the creek from East River to the head of navigation at Westchester 8 feet in depth at mean low water, 100 feet wide across the estuary, thence 80 feet wide to a point about 1,000 feet above Scriven's dock, and thence 60 feet wide to the head of navigation, estimated to cost, including contingencies, $42,780, and $2,000 annually for maintenance.

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[1] Not reprinted. Printed in House Doc. No. 111, Fifty-sixth Congress, first session.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF WESTCHESTER CREEK, NEW YORK.

Engineer Office, United States Army,
New York, N. Y., September 15, 1899.

General: I have the honor to submit the following report upon a preliminary examination of Westchester Creek, New York, made pursuant to the requirements of the river and harbor act of March 3, 1899:

The navigable part of Westchester Creek, which is a tidal stream, extends 2¾ miles from the town of Westchester to its outlet in the East River, between Clauson Point and Old Ferry Point, about 2½ miles west of Throgs Neck. At Westchester navigation is obstructed by a low, solid bridge, or causeway, which has no draw.

At Unionport, about 1 mile below Westchester, the creek is crossed by an iron drawbridge, which has ample draw openings for the passage of vessels.

The creek is now navigable at low tide for vessels drawing about 4 feet. The mean range of tides is about 7 feet.

The course of the creek is quite regular, the width between the banks increasing from about 110 feet at the head of navigation to 500 feet at the entrance to the estuary at the mouth, a distance of 1.7 miles.

Across the estuary, which is about a mile in length, the width increases from 500 feet at the mouth of the creek to about half a mile between the points of land at East River, which define the entrance to the estuary.

At East River the entrance is obstructed by a bar 1,300 feet in length, upon which the depth is but 4 feet; thence to Unionport, the depth is about 6½ feet; thence to the head of navigation, the depth is from 3½ to 4 feet at mean low water. The improvement desired is the enlargement of the channel necessary to make it 100 feet wide across the bar at the mouth; thence to the head of navigation 60 to 80 feet wide and 8 feet deep at mean low water, so that vessels may be enabled to navigate the creek at all stages of tide, whereas at the present time a large part of the commerce is limited to high tide, thus causing great delay and inconvenience to the rapidly increasing traffic in this avenue of commerce to the northeastern part of New York City.

In accordance with the terms of the river and harbor act of September 19, 1890, a preliminary examination and survey of Westchester Creek were made, and they are printed in the Annual Report of the Chief of Engineers for 1891, Part I, page 954. At that time the improvement desired was the same as at present, and the commerce was then reported to be 50,000 tons in 1890, with a valuation of $242,000, and the number of vessels employed 300. It is now represented that these amounts have been greatly increased since that time. Statistics have been promised and will be forwarded when received.

Harbor lines were established in the estuary as a part of the East River system in 1891, and in the creek they were established and approved by the Secretary of War June 29, 1894.

The depths in the creek have not changed in any essential respect since the survey of 1891, and the map made at that time is complete and will answer for present purposes, no survey being now necessary.

In my opinion Westchester Creek from East River to Westchester is worthy of improvement by the General Government.

Very respectfully, your obedient servant,

W. H. H. BENYAURD,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
September 20, 1899.

Respectfully submitted to the Secretary of War.

This is a report upon preliminary examination made of Westchester Creek, New York, under the provisions of the river and harbor act of March 3, 1899.

Lieutenant-Colonel Benyaurd is of opinion, concurred in by me, that this creek is worthy of improvement from East River to Westchester.

A survey in the ordinary sense is not required, and I recommend that I be authorized to direct the local officer to submit a plan and estimate of cost of the proposed improvement, the preparation of which can be effected without cost to the Government.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Second indorsement.]

WAR DEPARTMENT,
September 23, 1899.

Approved as recommended by the Chief of Engineers.

By order of the Secretary of War:

A. N. THOMPSON,
Acting Chief Clerk.

Commercial statistics in part of Westchester Creek for twelve months ending September 23, 1899.

[Furnished by Mr. A. J. Howell.]

Articles.	Quantity.a	Value.
Coal ... tons	25,700	$128,500
Brick	5,000,000	30,000
Lumber ... feet	5,000,000	25,000
Stone ... tons	35,000	35,000
Sand ... do	12,400	9,300
Cement ... barrels	4,000	4,000
Lime	5,000	4,000
Shingles ... bundles	1,000,000	8,000
Fence posts	2,000	300
Soda ash ... tons	1,400	10,200
Bicarbonate of soda ... do	1,500	105,000
Ashes ... do	2,000	1,200
Gravel ... do	1,500	1,800
Laths	1,000,000	5,000
Total		367,300

	Number.	Draft.
		Feet.
Sea schooners	7	11
Canal boats	104	7
Scows	55	10
Lighters	35	5

a Many of above aggregates are for last six months only.

A new plant is now building at head of creek with coal pocket capacity of 2,000 tons.

Respectfully,
A. J. Howell.

91 Wall Street,
New York, N. Y., September 23, 1899.

PLAN AND ESTIMATE OF COST OF IMPROVING WESTCHESTER CREEK, NEW YORK.

Engineer Office, United States Army,
New York, N. Y., November 28, 1899.

General: In compliance with Department letter of September 29, 1899, in regard to survey of Westchester Creek, New York, I have the honor to submit the following report, with plan and estimate, prepared to comply with the terms of the river and harbor act approved March 3, 1899:

Inasmuch as a complete instrumental survey of Westchester Creek was made in 1890, the map of which was submitted to the Chief of Engineers by Col. G. L. Gillespie, Corps of Engineers, on September 8, 1891, with a report upon the survey, and as this map was revised in 1894 to show location of harbor lines, approved by the Secretary of War June 29, 1894, and as inquiry of parties using the channel developed the fact that the natural depths in the creek have remained nearly permanent since the last survey, no field work was considered necessary in connection with this report. The estimates of 1891 have been revised to correspond with present conditions and prices. Since 1890 there has been a slight advance in general prices for dredging, and the dumping ground for that locality has been removed about 18 miles to the eastward.

The natural condition of Westchester Creek, as shown by the map accompanying this report, is as follows: The total length of the navigable part of the river, including the estuary, is 2⅝ miles; the distance across the estuary is three-fourths of a mile.

From East River to Scriven's dock, a distance of 4,000 feet, the low-water depth is from 9 to 10 feet, except across the bar at the mouth of the estuary, 1,300 feet in length, where the depth is about 4 feet. From Scriven's dock to the Eastern Boulevard Bridge at Unionport, a distance of 5,000 feet, the depth is about 6½ feet; thence to the head of navigation, a distance of 5,000 feet, the creek is navigable at low water for vessels drawing about 3½ feet. The navigable channel, with depths as above stated, has varying widths of from 20 to 80 feet. The mean range of tides is 7.1 feet.

The navigable part of the creek ends at Main street, Westchester, at which point there is a low, solid bridge or causeway, which has no draw. At the Eastern Boulevard crossing, at Unionport, there is a drawbridge, properly located in relation to the channel, which has draw openings of 50 feet in width. It is thought that no permanent works will be required to confine the channel in the cut proposed across the bar, as the long pool in the estuary retains its natural depth, which would seem to indicate that an excavated channel of the proposed depth could be maintained with occasional dredging. A small estimate for maintenance is therefore submitted, which it is proposed to apply to this and other parts of the improvement recommended.

The material in the bed of the creek is mud and sand, and that across the bar at the mouth of the estuary is sand. No rock is known to exist within the limits of the proposed channel.

No improvement of this creek has been made by the General Government. Its improvement was recommended in the report of 1891, above referred to.

A comparison of the statistics of 1890 with those recently furnished shows a considerable increase in the tonnage and value of the commerce and in the draft of vessels.

Table of comparative statistics.

FOR FISCAL YEAR ENDING JUNE 30, 1890.

[Draft of vessels, 5 to 8 feet.]

Articles.	Amount.	Value.
Coal .... tons..	8,000	$35,000
Brick	5,000,000	30,000
Lumber .... feet..	4,000,000	20,000
Stone .... tons..	10,000	10,000
Sand .... do....	15,000	9,000
Cement .... barrels..	5,000	5,000
Lime .... do....	10,000	5,000
Shingles .... bundles..	146,000	10,000
Locust posts	6,000	6,000
Soda ash .... tons..	1,400	42,000
Bicarbonate of soda .... do....	1,000	70,000
Total	....	242,000

FOR TWELVE MONTHS ENDING SEPTEMBER 23, 1899.[a]

[Draft of vessels, 5 to 11 feet.]

Articles.		Amount.	Value.
Coal	tons	25,700	$128,500
Brick		5,000,000	30,000
Lumber	feet	5,000,000	25,000
Stone	tons	35,000	35,000
Sand	do	12,400	9,300
Cement	barrels	4,000	4,000
Lime	do	5,000	4,000
Shingles	bundles	1,000,000	8,000
Fence posts		2,000	300
Soda ash	tons	1,400	10,200
Bicarbonate of soda	do	1,500	105,000
Ashes	do	2,000	1,200
Gravel	do	1,500	1,800
Laths		1,000,000	5,000
Total			367,300

[a] Many of above aggregates are for last six months only.

The cost of making a navigable channel in Westchester Creek from East River to the head of navigation at Westchester, 8 feet in depth at mean low water, 100 feet wide across the estuary; thence 80 feet wide to a point about 1,000 feet above Scriven's Dock; thence 60 feet wide to the head of navigation, is estimated as follows:

For dredging a channel 8 feet deep at mean low water and 100 feet wide across the estuary, 24,000 cubic yards, scow measurement, at 30 cents	$7,200
For dredging a channel 8 feet deep at mean low water and 80 feet wide, from the estuary to a point about 1,000 feet above Scriven's Dock, 10,000 cubic yards, scow measurement, at 30 cents	3,000
For dredging a channel 8 feet deep at mean low water and 60 feet wide, from a point about 1,000 feet above Scriven's Dock to the head of navigation, 90,000 cubic yards, scow measurement, at 30 cents	27,000
Total (cubic yards, 124,000)	37,200
Contingencies, supervision, etc., 15 per cent	5,580
	42,780
For annual maintenance	2,000

In view of the commercial interests involved it is my opinion that Westchester Creek, New York, is worthy of improvement by the General Government on the plans and to the extent above set forth.

Very respectfully, your obedient servant,

W. H. H. Benyaurd,
Lieut. Col. Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

F 22

EXAMINATION AND SURVEY OF DIAMOND REEF AND COENTIES REEF, EAST RIVER, NEW YORK.

[Printed in House Doc. No. 495, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, March 6, 1900.

Sir: The river and harbor act of March 3, 1899, provided for a preliminary examination and survey of Diamond Reef and Coenties

Reef, in East River, New York, with a view to their removal, and I now have the honor to submit the accompanying copy of report dated April 22, 1899, by Maj. H. M. Adams, Corps of Engineers, upon preliminary examination, and copy of report dated February 28, 1900, with map,[1] by Maj. W. L. Marshall, Corps of Engineers, upon survey of the locality.

The plan of improvement proposed by Major Marshall provides for removing these reefs, including that part of Diamond Reef known as reef off Diamond Reef, to a clear depth of at least 32 feet at mean low water (excavation estimated to a depth of 34 feet), at an estimated cost, including contingencies, of $1,897,500.

In the opinion of the local officer, improvement to the extent indicated is worthy of being undertaken by the General Government, and his views are concurred in by Col. G. L. Gillespie, Corps of Engineers, the division engineer.

Very respectfully, your obedient servant,

John M. Wilson.
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF DIAMOND REEF AND COENTIES REEF, EAST RIVER, NEW YORK, WITH A VIEW TO THEIR REMOVAL.

United States Engineer Office,
New York City, April 22, 1899.

General: I have the honor to submit the following report upon a preliminary examination of Diamond Reef and Coenties Reef, in East River, with a view to their removal, made under authority of the river and harbor act of 1899.

These reefs lie at the south end of East River, at and near its junction with Buttermilk Channel and the channel between the Battery and Governors Island, New York Harbor.

Diamond Reef covers an area, at the curve of 30 feet depth, about 800 feet long, with 600 feet greatest width. Coenties Reef, a quarter of a mile farther up East River, is about 280 feet long and 150 feet wide. Originally these reefs had least depths of 17.5 feet and 14.3 feet, respectively. In 1875 Coenties Reef was removed to a depth of scant 26 feet (about 25½ feet clear depth), and in 1892 the removal of Diamond Reef to 26 feet depth was completed.

Between East River and North River there is a natural channel of about 35 feet depth, having a general width of 1,200 feet except for a length of 1,000 feet, where Diamond Reef, lying in the south side of this channel, reduces the width to about 200 feet. Coenties Reef lies almost directly in the axis of this narrow channel, where the harbor is most crowded by vessels and where the tidal currents are very strong. These conditions make navigation there very difficult for vessels of too great draft to pass over the reefs.

The river and harbor act of 1896 ordered a survey of "the channel between the Battery and Governors Island, with a view to making a channel continuous with Buttermilk Channel thirty feet in depth and one thousand two hundred feet in width." In connection with this survey some borings were made to ascertain the area of Diamond Reef at this depth. The report, printed in the Annual Report of the Chief of Engineers for 1897, page 1182, contained estimates of cost of removing Diamond Reef and Coenties Reef to 32 feet depth. It also contained the following statements relating to the commerce of the vicinity:

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[1] Not reprinted. Printed in House Doc. No. 495, Fifty-sixth Congress, first session.

> There are no data showing the amount or value of the commerce which passes through the channel between the Battery and Governors Island. At different times during January, 1897, for four and one-third hours altogether, the numbers and kinds of vessels passing this channel have been observed, with the following as the average result per hour:

Kind of boats.	Number per hour.
Ferryboats	32
Towboats without tows, and small steamers	25
Towboats with tows	23
Barges, etc., in tow	25
Ships, barks, and brigs, in tow	2
Steam lighters	9
Large steamers	3
Car floats	5
Railroad ferries	1
Total	125

> Excluding the ferryboats, the total per hour is 93, of which 87 pass in midchannel or nearer the Battery shore.
>
> As nearly as can be estimated the observed traffic would be a fair average for ten hours of the day and nearly three times too great for the other fourteen hours, which would make the total traffic per day fifteen times that observed per hour.
>
> Similar observations made in summer would show a greater number of vessels; at that season there are from 50 to 100 excursion steamers daily passing the Battery, together with many pleasure boats, and large fleets of canal boats and barges from the Erie Canal and Upper Hudson, whose navigation is now [February, 1897] shut off by ice.

Nearly all of the above vessels pass close to or immediately over Diamond and Coenties reefs. All but the largest boats pass over the reefs freely, but the fact that the boats of deep draft must of necessity follow a narrow course in a crowded channel creates an obstruction to vessels of all kinds. Events within the past year have demonstrated the need of a deep and unobstructed channel from the sea to the New York Navy-Yard, in East River, above these reefs.

The survey of the channel between the Battery and Governors Island made in the winter of 1896-97 included borings sufficient to determine the approximate contour of these reefs at a depth of 32 feet below mean low water, and to make an estimate of the probable cost of removal. The season of the year (winter) was not favorable for making a detailed survey of the reefs, such as would be necessary before actual removal. Such a survey would be very expensive, under the most favorable conditions, on account of the rapid currents, the crowded channel, and the hard material underlying Diamond Reef. It could be made to best advantage during summer and fall months.

* * * * * * *

In my opinion the removal of Diamond Reef and Coenties Reef in East River, New York Harbor, to a depth of 32 feet below mean low water is a work of public importance, worthy to be undertaken by the United States in view of the great commercial interests involved. It is recommended that a detailed survey of these reefs be authorized * * *.

Very respectfully, your obedient servant,

H. M. ADAMS,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[Third indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, May 6, 1899.

Respectfully returned to the Chief of Engineers.

When work ceased on Diamond Reef and Coenties Reef the adopted navigable depth for this port was 26 feet at mean low water. Since 1892 the demand has been for increased depth extending to 35 feet mean low water, increased to 40 feet mean low water, over the bar at the southern entrance.

The great draft of modern naval vessels and the obstruction offered to their passage up East River at low tide, notably the accident to the U. S. S. *Massachusetts* within the past few months, show the importance of increasing the navigable depth over the reefs in the channel leading from the navy-yard to the lower bay to 35 feet at mean low water. I therefore concur in the recommendation of the district officer that the said reefs be lowered to the plane of 32 feet at mean low water, and that a survey to this end * * * be authorized.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

[Sixth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Diamond Reef and Coenties Reef, in East River, New York, with a view to their removal.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF DIAMOND REEF AND COENTIES REEF, EAST RIVER, NEW YORK, WITH A VIEW TO THEIR REMOVAL.

ENGINEER OFFICE, UNITED STATES ARMY,
New York, N. Y., February 28, 1900.

GENERAL: In compliance with Department letter dated August 18, 1899, I have the honor to submit the following report, with estimates, upon the survey of Diamond Reef and Coenties Reef, in East River, New York, made to comply with the terms of the river and harbor act approved March 3, 1899:

The results of the survey and locations of the reefs are exhibited on the accompanying map.

The original condition of these reefs and the reasons for their removal are fully stated in the report upon preliminary examination dated April 22, 1899, and in the report upon survey of channel between the Battery and Governors Island, printed as House Doc. No. 334, Fifty-fourth Congress, second session, and in Annual Report of the Chief of Engineers for 1897, pages 1182 to 1185, which also contains commercial statistics and estimates for the removal of the reefs to 32 feet at mean low water.

The commercial considerations involved in the removal of these reefs to meet the needs of navigation, both past and present, have been thoroughly reviewed in the above-mentioned reports and in the Annual Reports of the Chief of Engineers upon the improvement of East River for the past twenty years or more.

This survey has been conducted with a view of showing the character and amount of material necessary to be removed to make a clear depth of 32 feet at mean low water over Diamond Reef and Coenties Reef, which depth is now required to meet the demands of navigation at the mouth of East River.

The survey was planned and executed under direction of Lieut. Col. W. H. H. Benyaurd, by a party in charge of Mr. H. B. Gorham, assistant engineer. The field work was commenced on September 11, and completed on December 2, 1899. On account of the rapid tidal currents over and around the reefs, and the crowded condition of the channel by vessels of all classes, the floating plant required on the survey had to be of the most substantial character, and after due consideration the large dredge *Hell Gate* and the tug *General A. A. Humphreys*, of the East River rock-removing plant owned by the United States, were placed in commission and used until the completion of the field work. The dredge was run into several times without causing serious damage, but upon two occasions the damage was so great as to necessitate its withdrawal from the work for repairs. The bills for repairs in each of these cases were paid by the owners of the vessels which caused the damage.

The delays caused by collisions and a protracted period of foggy weather had the effect of prolonging the time of the survey at least a month, and thereby added considerably to its cost * * *. Experience has demonstrated that it is impossible for a vessel to remain at anchor over these reefs without being run into, and there are times when moving vessels are so numerous that there is an entire block in the navigation for a short period. This fact makes it necessary to add considerably to the estimated cost of removal of these reefs, particularly Coenties Reef, as any plant placed there for the purpose of working upon that reef is liable to be run into and sunk at any time. The borings and soundings were taken from the dredge, which was held in a fixed position by four large anchors and chains. The borings were made with a 3-inch steel angle or drill, and with few exceptions the holes were bored through to rock bottom. The exceptions were in cases where holes were carried to the full length of the drill and no rock was found. The dredge was moved into the required positions by hauling in the chains by means of the steam windlasses or winches with which the dredge is fully equipped. In each position 2 borings and 13 soundings were taken, and by means of systematic moves the dredge occupied eight positions per hour, during which time 16 borings and 104 soundings were taken.

It was found impracticable to secure accurate results by the means employed, during the full strength of the tides, consequently the work was carried on only during the period of slack tides and minimum velocities of the tidal currents.

The borings and soundings were located from the dredge by sextant angles to fixed stations upon the shores of Governors Island, New York, and Brooklyn. These shore stations were located by triangulation from the bases of the United States Engineer Department and United States Coast Survey.

There is a covering of loose material upon the reefs, particularly on Diamond Reef, which consists of gravel and broken stone left from former work. This loose material will be difficult to remove, and it is impracticable to make a separate estimate for its removal, as a quantity of such material will always remain lodged in the crevices all over the surface of the blasted reefs. Diamond Reef, at the 32-foot curve, at least, consists of two parts, the easterly part being known as "reef off Diamond Reef." The following estimates provide for the removal of both parts:

Estimates.

For removing Diamond Reef to make a clear depth of at least 32 feet at mean low water (excavation estimated to 34 feet), 48,000 cubic yards of rock, at $30 per cubic yard	$1,440,000
For removing Coenties Reef to make a clear depth of at least 32 feet at mean low water (excavation estimated to 34 feet), 9,500 cubic yards of rock, at $30 per cubic yard	285,000
Contingencies, supervision, etc., 10 per cent	172,500
Total	1,897,500

In my opinion the East River, New York, is worthy of additional improvement by the General Government on the plans and to the extent above set forth.

Very respectfully, your obedient servant,

W. L. Marshall,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

NORTHEAST DIVISION ENGINEER OFFICE,
New York, March 2, 1900.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. GILLESPIE,
Colonel, Corps of Engineers,
Division Engineer.

F 23.

PRELIMINARY EXAMINATION OF BAY SHORE, LONG ISLAND, NEW YORK, WITH A VIEW TO CONSTRUCTING A BREAKWATER.

[Printed in House Doc. No. 43, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, November 20, 1899.

SIR: The river and harbor act approved March 3, 1899, directs that a preliminary examination be made of Bay Shore, Long Island, New York, with a view to constructing a breakwater, and the examination thus provided for has been made by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers, whose report of September 20, 1899, of the results is submitted herewith.

Colonel Benyaurd states that a thorough investigation of the subject of the improvement of Bay Shore has developed the fact that no breakwater is needed or desired, and it is his opinion, concurred in by me, that the construction of a breakwater at that locality is a work not worthy to be undertaken by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF LIEUT. COL. W. H. H. BENYAURD, CORPS OF ENGINEERS.

ENGINEER OFFICE, UNITED STATES ARMY,
New York, N. Y., September 20, 1899.

GENERAL: I have the honor to submit the following report upon a preliminary examination of Bay Shore, Long Island, New York, with a view to constructing a breakwater, made pursuant to the requirements of the river and harbor act of March 3, 1899.

The village of Bay Shore is situated on the south side of Long Island, and its water front consists of an indentation of Great South Bay about opposite Fire Island Light.

The resident population of Bay Shore is about 3,000, which is largely increased during the summer months. At the head of this indentation, the eastern part of which is called Great Cove, are four tidal creeks extending inland about half a mile. These creeks are navigable to some extent and are used for commercial purposes, the three larger ones being named, respectively, Orowoc Creek, Awixa Creek, and Penataquit Creek.

The depths in the creeks are from 0 to 6 feet at mean low water, partly secured by dredging by private parties. The mean range of tides is 1.2 feet. The easterly creek—Orowoc Creek—extends to the westerly part of the town of Islip, which adjoins Bay Shore on the east. The indentation in Great South Bay at the mouth of these creeks is about a mile long and a mile wide, and the low-water depth in same is from 0 to 9 feet, the depth over the greater part of its area being at least 6 feet. The depth of 9 feet in the bay is not exceeded by the greatest depth in Great South Bay opposite Bay Shore and Islip.

A thorough investigation of the subject of improvement of Bay Shore has developed the fact that no breakwater is needed or desired. Parties interested would like to have the channel to Bay Shore—Penataquit Creek—deepened to 6 feet at mean low water, with a width of 100 feet.

No reliable statistics have been furnished.

Bay Shore has very little, if any, manufacturing or commercial interests. There is a steamer drawing about 6 feet making two round trips daily during the summer from Bay Shore to Fire Island, and there are a number of small yachts and other pleasure craft using the bay and creeks at Bay Shore. During the past year or two there have been extensive improvements in progress by reclaiming lowlands and erection of buildings on the east side of "Great Cove." These improvements have been carried on by Mr. H. O. Havemeyer. Considerable dredging has been done and the material pumped ashore. The statistics furnished, which are stated to be not accurate, include the material shipped for use in these works. No improvement is asked for in this part of the bay. It is stated in report of Col. G. L. Gillespie, printed in Annual Report of the Chief of Engineers for 1891, Part I, page 943, upon preliminary examination of Champlin Creek, in the town of Islip, that "there is at the western end of Islip, at Great Cove, a waterway with sufficient depth and safe anchorage."

In view of the facts as set forth in this report I am of the opinion that the construction of a breakwater for the improvement of Bay Shore is not worthy to be undertaken by the General Government.

Statistics referred to above are appended.

Very respectfully, your obedient servant,

W. H. H. BENYAURD,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

Commercial statistics of Bay Shore, Long Island, New York, for calendar year 1898.

Brick	$100,000
Coal	50,000
Oysters and clams	75,000
Fish and crabs	50,000
Lumber	200,000
Miscellaneous	50,000
Total	525,000

F 24.

PRELIMINARY EXAMINATION OF PATCHOGUE RIVER, NEW YORK, WITH A VIEW TO DEEPENING THE CHANNEL FROM FIRE ISLAND INLET TO PATCHOGUE TO A DEPTH OF 8 FEET AND WIDTH OF 80 FEET.

[Printed in House Doc. No. 133, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit the accompanying copy of report dated September 19, 1899, by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers, of the results of a preliminary examination of Patchogue River with a view to deepening the channel from Fire Island Inlet to Patchogue to a depth of 8 feet with a width of 80 feet.

This examination was made to comply with provisions of the river and harbor act approved March 3, 1899, and it will be seen from Colonel Benyaurd's report that, in his opinion, the work proposed is not worthy to be undertaken by the United States, and I concur in his views.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF LIEUT. COL. W. H. H. BENYAURD, CORPS OF ENGINEERS.

Engineer Office, United States Army,
New York, N. Y., September 19, 1899.

General: I have the honor to submit the following report upon a preliminary examination of Patchogue River, with a view to deepening the channel from Fire Island Inlet to Patchogue, made pursuant to the requirements of the river and harbor act of March 3, 1899:

Great South Bay consists of an area of open water lying between the mainland of Long Island and the ocean beach known as Fire Island Beach. The bay is about 25 miles long, and its width is from 2 to 5 miles. The ocean beach varies in width from an eighth to a half mile.

The depth of water at low tide over about one-half of the bay on the Fire Island side is from 1 to 6 feet; over the area near the Long Island shore the general depth varies from 6 to 11 feet at mean low water. The mean range of tides is 2.1 feet at Fire Island Inlet and 1.1 feet at Patchogue.

The main entrance from the ocean to Great South Bay is near its western end and through Fire Island Inlet. The low-water depth through the inlet is from 12 to 30 feet. Just inside the inlet are several well-defined channels branching off toward the north and east, with low-water depths of from 8 to 20 feet. The principal part of the area of the bay in this vicinity consists of flats covered by water from 0 to 4 feet in depth at low tide.

Patchogue River, a stream on the south side of Long Island extending from the village of Patchogue to Great South Bay, is near the eastern end of the bay. It is about 15 miles from Fire Island Inlet and about 55 miles in a direct line east from New York City. The channel followed by vessels bound for Patchogue, after passing through the inlet, runs eastwardly and nearly parallel with Fire Island Beach to "Point of Woods," on Fire Island Beach, a distance of about 6 miles. This part of the channel is crooked, but has ample depths.

From "Point of Woods" the channel deflects toward the north and continues a distance of about 2 miles; thence making a gradual turn toward the east it merges into the open and deeper part of the bay, through which the general low-water depth to Patchogue River entrance, a distance of 7 miles, is from 8 to 10 feet. The improvement desired is dredging to make a channel 10 feet deep and 100 feet wide at mean low water at the bend near "Point of Woods" and at the land in the middle of the bay above described; the present depths are about 8 feet at mean low water. It is represented that the commerce of Browns Creek, Sayville, Long Island, is also in need of this improvement, as vessels bound there follow the "Patchogue Channel." The bottom throughout this part of the bay is mud.

The commerce reported for the calendar year of 1898 is as follows:

PATCHOGUE RIVER, NEW YORK.

Arrivals and departures of vessels.

[Draft, 2 to 9 feet; tonnage, 8 to 350 tons.]

Class.	Number of round trips.	Aggregate tonnage of all trips.
		Tons.
Steamers	1,325	17,000
Sailing vessels	7,500	90,000
Barges	4,500	168,750
Total	13,325	835,750

Vessels of 9 feet draft can not come into the river without lightering.

Freight received and shipped by water.

Class.	Tons.	Estimated value.
Received:		
Coal	13,000	$65,000
Lumber	150,000	1,875,000
Miscellaneous	26,000	156,000
Shipped:		
Lumber	53,000	1,328,000
Fish and shellfish	5,200	158,000
Miscellaneous	8,000	120,000
Total	255,200	3,702,000

	Number.	Tons.
Vessels built during 1898	50	2 to 60
Vessels repaired during 1898	425	2 to 350

The above figures show an increase in freight over the amount reported for 1897, of 5,200 tons.

BROWNS CREEK, NEW YORK.

Freight received and shipped.

Articles.	Tons.	Estimated value.
Received:		
Coal, brick, etc	2,500	$15,800
Oysters received by water and shipped by rail	6,000	150,000
Clams	330	6,000
Shipped:		
Oysters	1,530	35,000
Clams	330	6,000
Fish	10	1,000
Total	10,700	213,800

Vessels using the creek.

Class.	Number.	Round trips.	Tonnage.	Draft.
			Tons.	*Feet.*
Sailing vessels with cargoes	....	720	5 to 50	2 to 5
Vessels for repairs	225	(*a*)	2½ to 15	2 to 4
Vessels using creek for shelter	200	(*a*)	2½ to 50	2 to 5

a Not known.

The amount of freight reported above is 1,520 tons more than reported for 1897.

To make and maintain an artificial channel 10 feet deep, or even 9 feet, at mean low water in the open bay would probably require a large amount of dredging, as well as expensive dikes or works of protection for the dredged channel. The depths stated in this report are based upon soundings taken during the preliminary examination and upon information derived from a study of the latest United States Coast Survey charts.

The river and harbor act of March 3, 1899, provides for an examination, "with a view to deepening the channel from Fire Island Inlet to Patchogue to a depth of eight feet, with a channel eighty feet in width." There is now about that depth existing over the shoalest parts of the channel at mean low water and about a foot more than that depth at high water.

In view of this fact I am of the opinion that the improvement of the channel through Great South Bay from Fire Island Inlet to Patchogue is not a work worthy to be undertaken by the United States.

Very respectfully, your obedient servant,

W. H. H. Benyaurd,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

F 25.

EXAMINATION AND PLAN AND ESTIMATE FOR IMPROVEMENT OF PATCHOGUE RIVER, NEW YORK.

[Printed in House Doc. No. 171, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 7, 1899.

Sir: I have the honor to submit the accompanying copy of reports by Lieut. Col. W. H. H. Benyaurd, Corps of Engineers, dated September 19, 1899, and December 4, 1899, respectively, upon preliminary examination and survey of Patchogue River, New York, made to comply with requirements of the river and harbor act of March 3, 1899.

Under a project completed in 1897 the channel of Patchogue River was made 60 feet wide and 6 feet deep at mean low water from Great South Bay to within 80 feet of the harbor lines at the head of navigation, widened at the head of the harbor to a width of 100 feet for a distance of 300 feet, and Lieutenant-Colonel Benyaurd now presents a plan for enlarging this channel, by dredging, to a width of 100 feet and to a depth of 8 feet, corresponding to the general natural depths in Great South Bay. The estimated cost of this work, including contingencies, is $19,550, and $2,000 annually for maintenance, and Lieutenant-Colonel Benyaurd states that he is of the opinion that the locality is worthy of improvement to this extent.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF PATCHOGUE RIVER, NEW YORK.

Engineer Office, United States Army,
New York, N. Y., September 19, 1899.

General: I have the honor to submit the following report upon the preliminary examination of Patchogue River, New York, made pursuant to the requirements of the river and harbor act of March 3, 1899:

Patchogue River is a small stream on the south side of Long Island, emptying into Great South Bay near its eastern end and about 55 miles in a direct line east from New York City. The village of Patchogue, which lies about a mile north of the mouth of the river, has a resident population of about 5,000, which is considerably increased during the summer months. The approach to Patchogue by water is through Fire Island Inlet, and thence by a rather crooked course for about 15 miles through Great South Bay. The maximum draft that can be carried over the shoalest part of the channel through the bay and up to within half a mile of the river's mouth is about 8 feet at low water.

Before improvement at the mouth of the river the natural channel shoaled up to about 2 feet at low water, which depth could be carried up to the village landings. The mean range of tides in Patchogue River is 1.1 feet.

About the year 1870 the State of New York made an appropriation for improving the entrance to this river. A jetty about 1,000 feet long was built from the west side of the mouth of the river and a channel dredged alongside of it. The jetty was built of a single row of sheet piling, with round piles at intervals of 6 feet, and riprapped along the sides. In 1891 about 200 linear feet of the piling remained, but was badly injured; the riprap could be traced for nearly the whole length of the work, but no trace of the dredged channel remained.

The river and harbor act of June 14, 1880, provided for a survey of the river, which was made that year. The report, dated October 30, 1880, and printed in the Annual Report of the Chief of Engineers for 1881, Part I, page 674, contained estimates for securing in the river a depth of 6 feet at mean low water, by means of dredging and diking at the mouth, at an estimated cost of $42,320. No appropriation was made for carrying out this work.

In 1886 another examination was made under authority of the river and harbor act of that year. The report on this examination, printed in the Annual Report of the Chief of Engineers for 1887, Part I, page 759, presented a project for improvement which was adopted in 1890, when appropriation was made by Congress for beginning the work. This project consisted in dredging to make a channel 60 feet wide and 6 feet deep at mean low water from Great South Bay to the head of navigation, a distance of about a mile, and protecting it at the mouth from westerly storms by a jetty 1,700 feet long, at an estimated cost of $40,000. This project was completed in 1897.

Appropriations for the improvement of this harbor have been made as follows:

Application.	Date.	Amount.
Constructing jetty and dredging	Sept. 19, 1890	$15,000
Dredging	July 13, 1892	8,000
Dredging and jetty	Aug. 18, 1894	4,000
Dredging	June 3, 1896	13,000
Total		40,000

A sketch of the river was printed in the Annual Report of the Chief of Engineers for 1893, Part I, page 984.

Harbor lines for Patchogue River were established by the Secretary of War January 17, 1894.

The improvement now desired is the enlargement of the dredged channel to 10 feet depth at mean low water and 100 feet wide from Great South Bay to the head of navigation. It is stated by those interested in the improvement that many of the vessels bound for Patchogue have to lighter off part of their cargo in the deep water of the bay about 10 miles from Patchogue.

The statistics, in tons, as shown by comparison since 1890, are as follows:

	Tons.		Tons.
1890	56,000	1894	145,000
1892	120,000	1895	129,485
1893	125,000	1896	143,500

The commerce reported for 1898 was as follows:

Arrivals and departures of vessels.

[Draft, 2 to 9 feet; tonnage, 8 to 350 tons.]

Class.	Number of round trips.	Aggregate tonnage of all trips.
		Tons.
Steamers	1,325	77,000
Sailing vessels	7,500	90,000
Barges	4,500	168,750
Total	13,325	335,750

Freight received and shipped by water.

Class.	Tons.	Estimated value.
Received:		
Coal	13,000	$65,000
Lumber	150,000	1,875,000
Miscellaneous	26,000	156,000
Shipped:		
Lumber	53,000	1,328,000
Fish and shellfish	5,200	158,000
Miscellaneous	8,000	120,000
Total	255,200	3,702,000

	Number.	Tons.
Vessels built during 1898	50	2 to 60
Vessels repaired during 1898	425	2 to 350

The above figures show an increase in freight over the amount reported for 1897 of 5,200 tons.

To make a channel 100 feet wide and 10 feet deep at mean low water would require dredging out into Great South Bay a distance of about 2 miles, and a channel of 10 feet depth would be greater than the general navigable depth in the bay. Such a channel would require a jetty for protection to prevent its filling up, and the great cost of such work will not be commensurate with the benefit to be gained. A practicable channel for this river would be one of 100 feet width and 8 feet depth at mean low water, and I am of the opinion that Patchogue River is worthy of improvement by the General Government to that extent.

In the river and harbor act of March 3, 1899, there is an additional item calling for a preliminary examination of Patchogue River with a view to deepening the channel from Fire Island Inlet to Patchogue with a depth of 8 feet and width of 80 feet at mean low water.[1] With this view of the requirements the above recommendation has been made.

No survey is necessary. The maps on file in this office, together with the observations made on the preliminary examination, afford sufficient data for preparing a plan and estimate for the improvement.

Appended are a copy and extract of letters bearing upon the importance of the desired work.

Very respectfully, your obedient servant,

W. H. H. BENYAURD,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

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[1] Report printed in House Doc. No. 133, Fifty-sixth Congress, first session.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
September 25, 1899.

Respectfully submitted to the Secretary of War.

This is a report upon preliminary examination made of "Patchogue River," New York, under the provisions of the river and harbor act of March 3, 1899.

It appears that the improvement at present desired is the enlargement of the dredged channel to 10 feet depth at mean low water and 100 feet wide from Great South Bay to the head of navigation.

To obtain these channel dimensions it would be necessary to dredge out into Great South Bay for a distance of about 2 miles, and Lieutenant-Colonel Benyaurd, the local officer, states that a depth of 10 feet would be greater than the general navigable depth in the bay, that the channel so improved would require a protective jetty to prevent its filling up, and that the great cost of such work would not be commensurate with the benefit to be gained.

A practicable channel for this river would, he states, be one of 100 feet width and 8 feet depth at mean low water, and it is his opinion, concurred in by me, that the river is worthy of improvement by the General Government to this extent.

A survey in the ordinary sense is not required, and I recommend that I be authorized to direct the local officer to submit a plan and estimate of cost of proposed improvement, the preparation of which can be effected without cost to the Government.

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Second indorsement.]

War Department,
September 27, 1899.

Approved as recommended by the Chief of Engineers.

By order of the Secretary of War:

A. N. Thompson,
Acting Chief Clerk.

EXTRACT FROM LETTER OF MESSRS. E. BAILEY & SONS, OF PATCHOGUE, N. Y., DATED APRIL 25, 1899.

Dear Sir: Yours of the 21st received. To complete Patchogue River improvement the channel should be 10 feet deep at mean low water and 100 feet wide. This would enable vessels coming to Patchogue to enter the river with full draft of water, which they could carry in the bay. The improvement of channel from Fire Island Inlet to Patchogue should be same as required at Patchogue River, viz, channel 10 feet deep and 100 feet wide. It would cost but very little more to make this improvement than it would to make channel 8 feet deep and 80 feet wide, as there are but two or, at the most, three very narrow shoals which should be dredged. These are located, first, about 7 miles from Patchogue; second, about 10 miles from Patchogue; third, about 11 miles from Patchogue. We are somewhat in doubt whether any improvement would be needed at the third shoal. Think the water is deep enough there, but are not entirely sure. The shoals are not more than from 200 to 300 feet across them. The dredged material can be deposited on shoal flats or in deep portions of channel, where it would not interfere with navigation, as would be considered most advisable. The improvement from Fire Island to Patchogue River would benefit the whole of the Great South Bay and would include a section of country bordering on the bay of from 25 to 35 miles in length. It would enable vessels to approach other places on the bay with the same depth of water that they could reach Patchogue. Some of the points would be Bayshore, Islip, Oakdale, Sayville, Bluepoint, Patchogue, Bellport, and a number of other villages and towns. The recent improvement of Browns Creek is, as you know, at Sayville and would be benefited by improvement from Fire Island to Patchogue.

* * * * * * *

PLAN AND ESTIMATE OF COST OF IMPROVING PATCHOGUE RIVER, NEW YORK.

ENGINEER OFFICE, UNITED STATES ARMY,
New York, N. Y., December 4, 1899.

GENERAL: In compliance with Department letter dated September 29, 1899, in regard to survey of Patchogue River, New York, I have the honor to submit the following report, with plan and estimate, prepared to comply with the terms of the river and harbor act approved March 3, 1899:

Inasmuch as several instrumental surveys of the river have been made in the period from 1880 to 1898, which have been used in the preparation of estimates and in the prosecution of the improvement heretofore carried on in this river and for the establishment of harbor lines, no field work in addition to that done in the preliminary examination was considered necessary in connection with the preparation of this report. The map[1] submitted with this report was compiled principally from a survey made in 1897, after completion of work under project of 1890.

The natural channel depth through Great South Bay to Patchogue River is about 8 feet at mean low water, and it is mainly upon this fact that the contemplated improvement of the river to the same depth is based.

Before the adoption in 1890 of the first project for improvement the natural depth in the river from Great South Bay up to the village wharves was about 2 feet at mean low water.

The mean range of tides is 1.1 feet.

Under the above-mentioned project, which was completed in 1897, the channel in the river was made 60 feet wide and 6 feet deep at mean low water from Great South Bay to 80 feet from the harbor lines at the head of navigation. At the head of the harbor, for a length of 300 feet, the channel was made 100 feet wide, to allow vessels to turn around. A riprap jetty 1,700 feet in length has been built on the west side of the mouth of the river, to protect the connecting channel between the mouth of the river and the bay. Appropriations aggregating $40,000 have been made for this improvement.

The measure of improvement now estimated for corresponds to the general natural depths in Great South Bay. The material to be removed is mud and sand.

Estimate.

Dredging 85,000 cubic yards of material, at 20 cents per cubic yard	$17,000
Contingencies, supervision, etc., 15 per cent	2,550
Total	19,550
Annual maintenance	2,000

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[1] Not reprinted. Printed in House Doc. No. 171, Fifty-sixth Congress, first session.

From information received from reliable sources it appears that the commerce in this river has increased from 56,000 tons, with a value of $650,000, in 1890, to 255,200 tons, with a value of $3,702,000, in 1898.

Appended is a list of vessels running to this port, showing draft of same.

In view of the increase in commerce and of the fact that the depth in the river is insufficient for the vessels which use it, I am of the opinion that Patchogue River is worthy of improvement by the General Government to the extent of the foregoing estimate.

Very respectfully, your obedient servant,

W. H. H. Benyaurd,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

List and draft of vessels using Patchogue River, New York.

Name.	Draft.	Name.	Draft.
	Feet.		*Feet.*
Franconia	10	Mary E. Lynch	10
Geo. A. Pierce	10	Jennie D. Bell	9
Wm. T. Parker	9½	Frank S. Hall	9
J. Dallas Marvil	9	Levi Harris	8
Magic	8	Grace Bailey	8½
Mary S. Ewing	8	Anna Brown	8
Jane Harris	7½	Emma Overton	7
Hickory	7	Hettie J. Dorman	8½
M. G. Suydam	7	Addie Sawyer	11
F. G. French	11	E. Waterman	12
Carrie C. Ware	10½	Terrapin	11
Nellie Eaton	10½	Florence A. Davenport	10½
Wm. H. Davenport	11	J. M. Haynes	11
Maggie Ellen	10	Mary E. Olys	10½
Douglas Haynes	11	J. S. Terry	9½
Chas. H. Trickey	10½	Geo. A. Howes	9
Jno. Cadwalder	11	B. F. Jayne	7½
Julia A. Berkele	9½		

F 26.

PRELIMINARY EXAMINATION AT SAG HARBOR, NEW YORK.

[Printed in House Doc. No. 77, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 15, 1899.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of Sag Harbor, N. Y., and I have the honor to submit herewith copy of report dated June 1, 1899, upon examination of said harbor made by the local engineer officer, Maj. H. M. Adams, Corps of Engineers. Preliminary examination and survey of this locality having been made in the years 1890 and 1891, and the local conditions remaining about the same, a new survey at this time is not considered necessary. A copy of a map[1] of the survey of 1891 is submitted herewith.

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[1] Not reprinted. Printed in House Doc. No. 77, Fifty-sixth Congress, first session.

In the opinion of Major Adams Sag Harbor is worthy of improvement by the United States to the extent of protecting the harbor and landings by building a breakwater, the estimated cost of which is $71,000.

The views of Major Adams are concurred in by the division engineer, Col. G. L. Gillespie, Corps of Engineers, and by me.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. H. M. ADAMS, CORPS OF ENGINEERS.

United States Engineer Office,
New York City, June 1, 1899.

General: I have the honor to submit the following report upon the preliminary examination of Sag Harbor, N. Y., made in pursuance of a provision of the river and harbor act approved March 3, 1899, and of orders of the Chief of Engineers, dated April 14, 1899.

Sag Harbor is a village of about 3,000 population, situated on Long Island, 24 miles west from Montauk Point, the extreme eastern end of the island. The harbor is a small bay, sheltered by Long Island on the south and west and partly by Shelter Island on the north. It is open to northeasterly storms.

A preliminary examination and survey of Sag Harbor, N. Y., were made under authority of the river and harbor act of 1890, the reports upon which are printed in the Annual Report of the Chief of Engineers for 1891, pages 859-861. The report upon the preliminary examination expresses the opinion that the harbor is worthy of an improvement to consist in building a breakwater for shelter from northeasterly storms. The report upon the survey states that—

> The object of the survey was to properly locate the breakwater and to make an estimate of cost. The accompanying tracing shows the proposed location and the water front, with soundings. A breakwater so located would effectually protect the water front and would also shelter an anchorage area of 16 acres having 9 feet depth at mean low water and about double that area with 6 feet depth.
>
> The estimate of the cost is as follows:
>
> For a riprap breakwater, extending from Conklin Point in a north-by-west direction about 1,330 feet, thence in a nearly northwest direction, 1,850 feet to the 9-foot curve, being a total length of 3,180 feet; the breakwater to be built to a height of 8 feet above mean low water (about 5 feet above high water,) with top width of 5 feet and side slopes of 1 upon 1—

41,400 tons of riprap, at an average cost of $1.50 per ton	$62,100
Contingencies and supervision, about 15 per cent	8,900
Total estimated cost	71,000

The improvement now needed is the same as that desired in 1891, viz, a breakwater to protect the wharves along the water front. The annual commerce now averages about the same as then.

Commercial statistics for the first nine months of the calendar year 1898.

[Furnished by Mr. H. French, of Sag Harbor, N. Y.]

FREIGHT RECEIVED BY WATER.

	Tons.	Value.
Coal	5,500	$25,000
Lumber (500,000 feet B. M.)	750	16,000
Other building materials	2,000	9,000
Miscellaneous	15,000	1,500,000
Total	23,250	1,550,000

FREIGHT SHIPPED BY WATER.

	Tons.	Value.
Horses and carriages	1,128	$902,750
Fish and vegetables	4,780	123,750
General freight	5,863	1,239,169
Total	11,771	2,265,669

Vessels entering harbor in above nine months:

Steamers	674
Sail vessels	75
Total	749

Tonnage of above vessels, 4 to 1,205 tons; draft, 3 to 12½ feet.

Number of passengers carried in steamers to and from Sag Harbor in nine months, 30,000.

Number of vessels making regular or frequent trips to Sag Harbor, 84.

Population of village, about 4,250.

The harbor is used as a water outlet by about 217 square miles of surrounding country, having a population of 9,743.

At same rate the commerce for a full year (twelve months) would be: Freight received and shipped, 46,695 tons, valued at $5,087,559; vessels entering harbor, total number, 1,000; passengers to and from Sag Harbor by steamers, 40,000.

In my opinion Sag Harbor is worthy of improvement by the United States to the extent of protecting the harbor and landings by building a breakwater on the lines planned in 1891, at an estimated cost of $71,000.

Inquiry among those familiar with the harbor and its navigation shows that there are no notable changes in depths and shore line since the survey of 1891. Therefore the map transmitted to the Chief of Engineers with report dated September 15, 1891, fairly illustrates the present condition of the harbor, and a new survey is not considered necessary.

Very respectfully, your obedient servant,

H. M. Adams,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, June 30, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

F 27.

PRELIMINARY EXAMINATION OF THREEMILE HARBOR, LONG ISLAND, NEW YORK.

[Printed in House Doc. No. 62, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit herewith a copy of report, dated May 20, 1899, by Maj. H. M. Adams, Corps of Engineers, of the results of a preliminary examination of Threemile Harbor, Long Island, New York, made to comply with provisions of river and harbor act approved March 3, 1899.

The local officer is of opinion, concurred in by Col. G. L. Gillespie, Corps of Engineers, the division engineer, and by me, that the harbor is not worthy of improvement by the General Government under existing conditions.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF MAJ. H. M. ADAMS, CORPS OF ENGINEERS.

United States Engineer Office,
New York City, May 20, 1899.

General: I have the honor to submit the following report of preliminary examination of Threemile Harbor, Long Island, New York, made in pursuance of a provision of the river and harbor act of March 3, 1899, and of order of the Chief of Engineers dated April 14, 1899.

Threemile Harbor is a landlocked bay on the north shore of the south fork of Long Island, 18 miles west from Montauk Point Lighthouse, and 5 miles east from Sag Harbor. The nearest village and railroad station is East Hampton, 2 miles south from the head of the harbor.

The harbor itself is 2 miles long and 1 mile wide at the widest part, of a general triangular shape, with the base toward Gardiners Bay, from which the harbor is separated by a sand beach, with entrance channel at the east end of the beach. The location of Threemile Harbor is best shown on the United States Coast and Geodetic Survey chart of Gardiners Bay (No. 298). According to this chart the harbor has a maximum depth of 13 feet, with 6 feet depth or more over an area of three-fourths of a square mile.

The entrance channel is narrow and rather crooked. The depth of this channel inside the beach is said to be about 6 feet, except where two small sand spits reduce it somewhat. At and outside the beach there is a bar of sand and small stones, with minimum depth of 1½ feet. From the beach to 8 feet depth in Gardiners Bay is about one-fourth mile.

The improvement desired is the opening of a channel from deep water in Gardiners Bay to the inner harbor, with depth of 6 or 8 feet at mean low water, and the securing of the channel by jetties extending out into the bay. The location is exposed, and the conditions are somewhat similar to those at Port Jefferson Inlet, New York. The desired improvement would be expensive to make, and probably would involve frequent expenditures to maintain.

The primary object for which the improvement is desired is to afford an accessible harbor for yachts for the accommodation of residents and summer visitors at East Hampton. It is represented that a great many such yachts would be kept there if there were a safe and accessible harbor for them. At present but one such vessel is kept at Threemile Harbor. It is also stated that there are large areas of woodland adjoining the harbor, which contain great quantities of wood suitable for posts and firewood, but which can not profitably be brought into market on account of the long haul by wagons. This could be shipped by water if the harbor were accessible to small boats.

There are two farmhouses and a few small fishermen's houses along the shores of the harbor, but no considerable settlement, and no commerce now existing.

The harbor is not near enough to the general line of traffic through Long Island Sound, nor is the proposed depth sufficient to make it available as a general harbor of refuge.

In my opinion the improvement of Threemile Harbor is not advisable nor worthy to be undertaken by the United States under existing conditions. No survey is recommended.

Very respectfully, your obedient servant,

H. M. Adams,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

Northeast Division Engineer Office,
New York, May 22, 1899.

Respectfully forwarded to the Chief of Engineers, concurring in the views of the district officer.

G. L. Gillespie,
Colonel, Corps of Engineers,
Division Engineer.

F 28.

MODIFICATION OF HARBOR LINES IN EAST RIVER, NEW YORK, FROM OAK POINT TO BRONX RIVER.

New York Harbor Line Board,
New York City, April 5, 1900.

General: In compliance with your indorsement dated January 21, 1899, the New York Harbor Line Board has considered the application of Gen. Egbert L. Viele, president of the East Bay Land and Improvement Company, dated January 17, 1899, for a modification of the bulkhead line on East River, New York, between Oak Point and the Bronx River, and has the honor to report as follows:

On February 23, 1900, General Viele wrote to the president of the Board stating more definitely the change desired. This letter and its accompanying map have formed the basis of the Board's consideration of this matter, and are forwarded herewith.

The change desired will not, in the opinion of the Board, be at all detrimental to the interests of navigation, but, on the contrary, should the bulkhead be established on the line indicated, dangerous rocks and bowlders, removable only at great expense, would be covered, and the channel thereby be made more safe in this vicinity. While making this change it seems unnecessary to leave the slight angle in the bulkhead line near the foot of Poillon street, so the Board has gone back to the next turning point at One hundred and forty-ninth street to tie to the old description..

The Board, therefore, recommends that the existing bulkhead line in the locality in question be modified as shown in a tracing[1] which accompanies this report. The following is a description of the line as modified:

> Beginning at a point in the bulkhead line approved by the Secretary of War January 9, 1891, in the southerly prolongation of a line 40 feet west from the westerly side of One hundred and forty-ninth street, and parallel thereto, 418 feet south from the northerly side of Edgewater road; thence in a straight line to a point in the southerly prolongation of the east side of Arnold street, 252 feet south from the northerly side of Edgewater road; thence easterly in a straight line to a point in the southerly prolongation of a line 90 feet east from the easterly side of Craven street, and parallel thereto, 375 feet south from the southerly side of Conover avenue; thence southerly in a straight line to a point in the southerly prolongation of a line 8 feet west from the easterly side of Casanova street and parallel thereto, 300 feet south from the southerly side of Coster avenue; said last-mentioned point being in the bulkhead line approved by the Secretary of War June 11, 1892.

Respectfully submitted.

HENRY M. ROBERT,
Colonel, Corps of Engineers.
G. L. GILLESPIE,
Colonel, Corps of Engineers.
W. L. MARSHALL,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
April 12, 1900.

Respectfully submitted to the Secretary of War.

Gen. Egbert L. Viele, president of the East Bay Land and Improvement Company, requests a modification of the established bulkhead line on East River, New York, between Oak Point and Bronx River.

The matter has been under consideration by the New York Harbor Line Board, which recommends modification of the existing bulkhead line as indicated herein.

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[1] Not printed.

In the opinion of the Board the change desired will not be at all detrimental to the interests of navigation, and I concur in its recommendation that the existing bulkhead line at the locality in question be modified as described in this report and shown upon the chart accompanying.

It is recommended that the Secretary place his approval upon both the report and the tracing submitted.

The latter has been prepared for his signature.

A. Mackenzie,
Acting Chief of Engineers.

[Second indorsement.]

War Department,
April 14, 1900.

Approved as recommended by the Acting Chief of Engineers.

Elihu Root,
Secretary of War.

LETTER OF GEN. E. L. VIELÉ, PRESIDENT EAST BAY LAND AND IMPROVEMENT COMPANY.

The East Bay Land and Improvement Company,
25 Pine Street, New York City, February 23, 1900.

Dear Sir: Accompanying this letter is a map of that portion of the property of the East Bay Land and Improvement Company, along whose water front a change is requested in the bulkhead line previously established by your Board, and in accordance with my request to the Secretary of War. The change is a simple one and is confined to the moving out of the bulkhead line a distance of 45 feet, commencing at the line of the property of the New York, New Haven and Hartford Railroad Company, and extending eastward parallel to the present bulkhead line until it meets that line as deflected near Truxton street.

Yours, very truly,
E. L. Vielé, *President.*

Colonel Robert,
U. S. Engineer Corps, Chairman Harbor Line Board.

F 29.

MODIFICATION OF HARBOR LINES IN EAST RIVER BETWEEN THIRTY-SEVENTH AND THIRTY-EIGHTH STREETS, NEW YORK CITY.

City of New York,
Department of Docks and Ferries,
New York, May 4, 1900.

Sir: At a meeting of the board of docks held this day I was directed to transmit for your approval plans in duplicate showing proposed change in the bulkhead line between Thirty-seventh and Thirty-eighth streets, East River.

This change has been approved by the board governing this department.

The effect of this change is to place the bulkhead line on an angle instead of making a right-angle bend from the southerly side of East Thirty-eighth street, which would not only make the building of the bulkhead wall more expensive, but would also make a pocket for the reception of mud and other refuse.

Yours, respectfully,
Wm. H. Burke, *Secretary.*

Hon. Elihu Root,
Secretary of War.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
May 8, 1900.

Respectfully referred to Col. Henry M. Robert, Corps of Engineers, for consideration and report by the New York Harbor Line Board.

By command of Brigadier-General Wilson:

A. MACKENZIE,
Lieut. Col., Corps of Engineers.

[Third indorsement.]

NEW YORK HARBOR LINE BOARD,
New York City, May 11, 1900.

Respectfully returned to the Chief of Engineers, with recommendation that the within application of the department of docks and ferries of New York City be approved.

For the Board:

HENRY M. ROBERT,
Colonel, Corps of Engineers, President Harbor Line Board.

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
May 15, 1900.

Respectfully returned to the Secretary of War.

The department of docks and ferries of the city of New York requests that a change be made in established bulkhead line on East River between Thirty-seventh and Thirty-eighth streets, as shown in red on the accompanying map.[1]

Attention is invited to the recommendation of the New York Harbor Line Board in third indorsement hereon, in which I concur.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT, *May 17, 1900.*

Approved as recommended by the New York Harbor Line Board and the Chief of Engineers.

ELIHU ROOT,
Secretary of War.

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[1] Not printed.

APPENDIX G.

IMPROVEMENT OF NEW YORK HARBOR, OF BAY RIDGE, RED HOOK, AND BUTTERMILK CHANNELS, AND GOWANUS CREEK CHANNEL, NEW YORK.

REPORT OF MAJOR W. L. MARSHALL, CORPS OF ENGINEERS, OFFICER IN CHARGE FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. New York Harbor, New York.
2. Bay Ridge and Red Hook channels, and Buttermilk Channel, New York Harbor.
3. Gowanus Creek Channel, New York.
4. Removing sunken vessels or craft obstructing or endangering navigation.

HARBOR LINES.

5. Jersey Flats, upper New York Bay, opposite Greenville, N. J.

United States Engineer Office,
New York, N. Y., July 17, 1900.

General: I have the honor to transmit herewith annual reports upon works of river and harbor improvement in my charge for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

W. L. Marshall,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

G 1.

IMPROVEMENT OF NEW YORK HARBOR, NEW YORK.

New York Harbor is the general designation of the water front of and approaches to the city of New York, comprising the Upper and Lower bays and parts of the Hudson, East, and Harlem rivers.

New York Harbor has two entrances, one from Long Island Sound by East River and Hell Gate, used by vessels trading eastward between New York, the Eastern States, and British American provinces; the other, the main entrance from the sea, by Sandy Hook through the Narrows, used by trans-Atlantic and Southern traffic. The title "Improvement of New York Harbor" has been applied to improvement of the channel of the main entrance from the sea.

From the Battery, at the lower end of New York City, out through the Narrows to the Lower Bay, a total distance of about 9 miles, there is a natural channel fairly broad and unobstructed, with available depths of 45 feet or more at mean low tide. The Lower Bay is separated from deep water of the ocean by a bar from 2 to 5 miles across, which, except for the channels crossing it, extends all the way from Sandy Hook to the west end of Coney Island, a distance of 7 miles. On the west side of this bar the Main Ship Channel extends southward from the Narrows to Sandy Hook, with natural depth of 23.3 feet, since deepened to 30 feet depth, mean low water.

Five distinct natural channels, separated by sand shoals, cross this bar, in order as follows, from the north or Coney Island shore:

(1) The Coney Island Channel, straight, narrow, with a general depth of 20 feet except at the west end, where the available depth is but 10 feet. South of this channel lies a shoal known as East Bank, with least depth of 6 feet.

(2) The Fourteen-foot Channel, a curving channel with considerable depths in the west part, but with only 15 feet depth at the eastern end. To the south lies a shoal with 5½ feet least depth.

(3) The East Channel, a broad, nearly straight channel of 30 feet depth or more in the western part, separated from deep water on the east by a bar having only 19 feet depth. South of this channel lies Romer Shoal, with 3 feet least depth.

(4) The Swash Channel, with 22 feet depth in a narrow channel. To the south lies a shoal called Flynns Knoll, with least depth of 11 feet.

(5) The Bayside Channel, formerly called Main Channel, a broad channel passing close to the north shore of Sandy Hook, with natural depth of 28 feet.

The southern part of the Main Ship Channel, with the Swash and Bayside channels, form nearly an equilateral triangle, the two last-named intersecting in a deep hole of considerable area rather more than midway across the bar. Outside this deep hole the bar was about 20 feet deep and was crossed by two channels, the north, called Gedney Channel, about 1½ miles long to deep water, and the south, called South Channel, somewhat longer, extending southeast nearly in continuation of the Swash Channel. Gedney and South channels both had natural depths of 24 feet.

Thus the natural channels afforded an available low-water depth from the ocean to the lower wharves of New York City of 23.3 feet, the distance from the outer side of the outer bar being 21 miles.

PROJECT FOR IMPROVEMENT.

The project, as adopted in 1884 and subsequently extended, consisted in making and maintaining a channel 1,000 feet wide and 30 feet deep at mean low water from New York harbor to deep water in the Atlantic, by way of the Main Ship, Bayside, and Gedney channels, at an estimated cost of $1,490,000. Work was begun September 26, 1885, and the project was completed October 10, 1891. Appropriations since that time have been applied to maintaining the channel by increasing its width and by removing shoals.

Under special projects between 1863 and 1894 small allotments from various appropriations have been from time to time expended in protecting the north shore of Sandy Hook by building jetties from high-water mark out to below low water and by building riprap sea walls alongshore just below high-water line.

Under the terms of the river and harbor act of March 3, 1899, a new project was adopted for connecting deep water in the lower bay with the ocean by channel 2,000 feet wide and 40 feet deep at mean low water, crossing the bar by way of East (or Ambrose) Channel, at a limit of cost of $4,000,000.

Further detailed descriptions of the harbor and improvements are printed in the Annual Reports of the Chief of Engineers for 1885, page 773, and for 1897, page 1031.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

At the beginning of the year the U. S. dredging steamer *Gedney* was at work deepening shoals in the Main Ship Channel. This work was continued during the year principally on the shoal on the west side of the channel at and near the south end. The removal of the shoal was completed.

During the year, 176,451 cubic yards of material were dredged, all from the Main Ship Channel.

The working time and lost time during the year were as follows:

	Days.
Actually at work	142
Work prevented by weather, fogs, ice, storms, etc.	82
Time occupied in repairs	69
Lost, other causes	12
Total	305

The repairs, as far as possible, were made during the winter months, when the weather is least favorable for work. Minor repairs were made on days when occasional storms prevented dredging.

The actual cost of operating expenses per cubic yard of material dredged, including repairs and supplies, is estimated at 15.7 cents during the past year. The material was almost wholly mud of different degrees of stiffness; the distance from the place of excavation to the place of deposit was about 8½ miles.

Under the project for making Ambrose Channel 2,000 feet wide and 40 feet deep at mean low water a contract was entered into May 12, 1899, approved by the Chief of Engineers May 24, 1899, for excavating this channel, removing about 42,500,000 cubic yards of material at 9 cents per cubic yard, scow measurement. The specifications require that excavation shall begin within twelve months from the date of approval of the contract, and that during eight working months of the year the average monthly rate of excavation shall be not less than 400,000 cubic yards during the first working year, and not less than 1,200,000 cubic yards during each succeeding year. Dredging under the contract has not yet been begun.

The contractor has in process of construction two hydraulic steel dredges of the Liverpool type, each 300 feet long, 52½ feet beam, 25 feet depth of hull, provided with a 48-inch pump, and each with carrying capacity of 3,000 cubic yards of material. Delays in construction have prevented the completion of these vessels by the time required for beginning work. As there is no existing plant in this vicinity at all adapted to the work, and as it appeared useless to require beginning with an insufficient plant, at the contractor's request the date for beginning work was deferred, with approval of the Chief of Engineers dated March 7, 1900. It is expected that excavating will be begun during the latter part of the ensuing fall.

PRESENT CONDITION OF IMPROVEMENT.

The improved channel from deep water below the Narrows to the sea by way of Sandy Hook has a depth of 30 feet and general width of 1,000 feet or more throughout its length. At the bend at Northwest Shoal the channel has been made 2,000 feet wide.

Ambrose (East) Channel has not yet been deepened, and the available depth across the bar in range of the projected improvement is 16 feet.

PROPOSED OPERATIONS.

Under the completed project of 1884 the available funds and future appropriations will be applied to maintaining the channel depths and to increasing the width at points where shoaling has occurred.

Under the project of 1899 it is expected that excavating in Ambrose Channel will be begun the latter part of the calendar year of 1900.

This work is in the collection district of New York. Nearest light-houses, Sandy Hook and Highland Lights. The nearest forts are Fort Hancock, Sandy Hook, New Jersey, and Forts Hamilton and Wadsworth, at the Narrows, New York Harbor.

Following is explicit information as to estimate of funds required for the fiscal year ending June 30, 1902, for dredging Ambrose Channel under the continuing contract authorized by the river and harbor act of March 3, 1899:

The river and harbor act of 1899 appropriated $1,000,000 for improving New York Harbor "by a deep channel 2,000 feet wide and 40 feet deep from the Narrows, by the so-called East Channel" (since named Ambrose Channel) "across Sandy Hook Bar to the open sea;" and also authorized the entering into a contract or contracts for the completion of the project at a cost "not to exceed in the aggregate $3,000,000, exclusive of the amount herein and heretofore appropriated." The appropriation of $1,000,000, made by act of March 3, 1899, is the only one yet made for this project.

Under the terms of the contract the contractor is required to dredge, by June 30, 1902, a minimum amount of 14,240,000 cubic yards, which, at 9 cents per cubic yard, amounts to $1,281,600. While the contractor will undoubtedly try to exceed this amount by working whenever possible during winter months, it will hardly be possible for him to greatly exceed it, and it is estimated that 15,000,000 yards, more or less, amounting to about $1,400,000, will be the extent of liability to be incurred under this contract up to June 30, 1902. It is not possible to make a more definite estimate of the work which may be done until the contractor's plant has begun work and its actual efficiency has been noted.

For these reasons $400,000 is estimated as the amount required, in addition to available balances, to meet obligations up to June 30, 1902, under continuing contract for excavation of Ambrose Channel.

Money statements.

GENERAL IMPROVEMENT.

July 1, 1899, balance unexpended	$101,584.23
June 30, 1900, amount expended during fiscal year	39,102.98
July 1, 1900, balance unexpended	62,481.25
July 1, 1900, outstanding liabilities	2,184.96
July 1, 1900, balance available	60,296.29
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	75,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	

AMBROSE CHANNEL.

July 1, 1899, balance unexpended		$999,938.74
June 30, 1900, amount expended during fiscal year		588.70
July 1, 1900, balance unexpended		999,350.04
July 1, 1900, outstanding liabilities	$12,333.33	
July 1, 1900, amount covered by uncompleted contracts	3,825,000.00	
		3,837,333.33
Amount (estimated) required for completion of existing project		3,000,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		400,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations for improving New York Harbor have been made as follows:

Application.	Date.	Amount.
For Gedney Channel, dredging via Sandy Hook	July 5, 1884	$200,000.00
For New York Harbor	Aug. 5, 1886	750,000.00
Do	Aug. 11, 1888	380,000.00
Do	Sept. 19, 1890	160,000.00
Do	July 13, 1892	170,000.00
Do	Aug. 18, 1894	75,000.00
Do	June 3, 1896	60,000.00
Do	Mar. 3, 1899	100,000.00
		1,895,000.00
Received from other sources		28,024.52
Total		1,923,024.52
For East (Ambrose) Channel, dredging	Mar. 3, 1899	1,000,000.00

CONTRACT IN FORCE DURING THE FISCAL YEAR ENDING JUNE 30, 1899.

With Andrew Onderdonk, of New York City, N. Y., for excavating in East (Ambrose) Channel, New York Harbor, and removing about 42,500,000 cubic yards of material, at rate of 9 cents per cubic yard; date of contract, May 12, 1899; approved by the Chief of Engineers May 24, 1899; date for beginning work, twelve months from date of approval of contract; date of expiration, indefinite, depending on appropriations by Congress. Work not yet begun.

COMMERCIAL STATISTICS.

The following statement concerning foreign commerce of the port of New York is compiled from the annual report of the Chamber of Commerce of the State of New York for the year 1899-1900. It comprises only imports from and exports to foreign countries, and does not include the domestic, coastwise, and local traffic. Vessels trading with domestic ports are not required to take out clearance papers, and no attempt is made to collect statistics of their carrying trade.

The leading articles of imports into the United States at the port of New York for the year ending June 30, 1899, were sugar, molasses, coffee and tea, wool, cloths and dress goods, leather and leather goods, tin, rubber, tobacco, with other miscellaneous imports, aggregating about 3,600,000 tons, valued at $518,040,409.

The value of such imports for all other ports of the United States for the same period was $298,737,739.

The leading articles of export were cotton, breadstuffs and other provisions, oils, tobacco, metals, and manufactures, which, with the miscellaneous items, aggregated about 7,504,510 tons, valued at $541,773,504.

The value of such exports for all other ports of the United States for the same year was $774,090,989.

Statement of the number and tonnage of all vessels belonging to the port of New York June 30, 1899.

	Number.	Tonnage.
Sailing vessels	1,533	307,847
Steam vessels	1,161	510,776
Canal boats	245	30,492
Barges	830	187,320
Total	3.769	1,036,435

From the records of the New York and New Jersey pilot commissioners the following data concerning deep-draft vessels crossing Sandy Hook Bar have been compiled for the calendar year 1899:

Draft.	Leaving.		Arriving.	
	Number of vessels.	Number of trips.	Number of vessels.	Number of trips.
32 feet or over	4	4		
31 feet and under 32 feet	7	23		
30 feet and under 31 feet	13	23		
29 feet and under 30 feet	28	94		
28 feet and under 29 feet	55	170	2	4
27 feet and under 28 feet	71	235	5	16

Maximum draft of vessels leaving the harbor, 32 feet 3 inches. Maximum draft of vessels entering the harbor, 28 feet 6 inches.

Total number of vessels of 27 feet draft or over, 99.

Prior to the improvement of Gedney Channel, vessels drawing 27 feet could cross the bar only at extreme high tide.

G 2.

IMPROVEMENT OF GOWANUS BAY CHANNEL, BAY RIDGE, RED HOOK, AND BUTTERMILK CHANNELS, NEW YORK HARBOR.

The main channel from The Narrows to the East River, New York Harbor, passes to the west and northwest of Governors Island. It has natural depths of 35 feet or over and generally an ample width. There is an eastern channel which skirts the Brooklyn water front, extending northwardly from Bay Ridge, crossing Gowanus Bay, rounding Red Hook, and thence by way of Buttermilk Channel, connecting with the East River. The lower part of this channel from Bay Ridge to Erie Basin had natural depths of from 7 to 12 feet. Opposite Gowanus Bay it was separated from the main channel of the harbor by a large shoal of about 9 feet depth; the upper part had a depth of 26 feet in a channel 300 feet wide or more, but crooked, and on account of the rapid current and the large amount of traffic in and near its junction with the East River it was formerly regarded as one of the most difficult places to navigate in New York waters. The line of docks along the water front of this east channel, and especially in the upper part, from the Brooklyn Bridge to Red Hook, is one of the most important in New York Harbor.

PROJECTS FOR IMPROVEMENT.

Prior to 1896 this improvement was carried on under two separate titles: Improvement of Buttermilk Channel, New York Harbor, which included the removal of Buttermilk and Red Hook shoals, and improvement of Gowanus Bay, New York Harbor, which included Bay Ridge and Red Hook channels and the triangular area between them, and also Gowanus Creek Channel.

In 1880 a project was adopted, which was subsequently extended to provide for the entire removal of Buttermilk Shoal, in the north part of Buttermilk Channel, to 26 feet depth.. This work was completed July 3, 1891, 1,269,484 cubic yards of material having been removed at a total cost of $321,000.

In 1890 a project was adopted for removing to 26 feet depth Red Hook Shoal, in Buttermilk Channel, between Red Hook Point and Governors Island. Up to July 1, 1896, nearly one-third of this shoal had been removed.

Under the river and harbor act of 1880 a project for improving Gowanus Bay channels was adopted, providing for a depth of 21 feet at mean low water, afterwards increased to 26 feet depth. Under this project as modified up to July 1, 1896, Red Hook Channel had been made 200 feet wide and 26 feet deep, an additional 150 feet of width being made 21 feet deep; Gowanus Creek had been made 21 feet deep between the harbor lines; Gowanus Canal had been made 12 feet deep up to Hamilton Avenue Bridge. Bay Ridge Channel had been made 175 to 200 feet wide and 26 feet deep, an additional width of 175 to 200 feet being made 21 feet deep.

By the terms of the river and harbor act of 1896, the Bay Ridge and Red Hook channels, the triangular area between them, and Buttermilk Channel were consolidated into one improvement, and a project for deepening the channels was adopted. This project was completed June 24, 1899, the channels being made 26 feet deep at mean low water, with widths as follows: Bay Ridge Channel, 800 feet; the triangular area between Bay Ridge and Red Hook channels, maximum width of 900 feet; Red Hook Channel, 400 feet; Buttermilk Channel, at Red Hook Shoal, 1,000 feet. Under the same project, also, Gowanus Canal, from Percival street to the Hamilton Avenue Bridge, was made 18 feet deep, with widths from 55 to 155 feet.

Under the terms of the river and harbor act of 1899, a project was adopted for making Bay Ridge and Red Hook channels 1,200 feet wide and 40 feet deep at mean low water, at a limit of cost of $2,500,000, and under authority of the same act a continuing contract for the whole work has been entered into.

Harbor lines in Gowanus Bay and Buttermilk Channel were established by the Secretary of War March 4, 1890. These harbor lines in the Gowanus Creek Channel were slightly modified by act of Congress passed June 3, 1896.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

During the previous fiscal year proposals for excavation necessary to the completion of the project of 1899 had been received and rejected, and the work had been readvertised.

Proposals were again received July 19, and under date of July 31, 1899, a contract was entered into with the lowest bidders, Hughes Bros. & Bangs, of Syracuse, N. Y., to dredge Bay Ridge Channel and Red Hook Channel to a depth of 40 feet at mean low water, with 1,200 feet width, excavating and removing 22,000,000 cubic yards, more or less, at rate of 10 cents per cubic yard, measured in scows or other vessels. The contract was approved by the Chief of Engineers, August 14, 1899. The specifications provided that the rate of excavation should be approximately 300,000 cubic yards per month for ten months of the year, and that it should begin within nine months from the date of approval of contract. The contractors represented that they had found it impossible to get an adequate plant ready for this work by the time fixed for beginning, and, with approval of the Chief of Engineers, an extension of time for beginning was granted.

The contractors are building two dredges and ten scows, the latter of about 1,800 cubic yards capacity each. They expect to have their plant at work during the fall.

A survey of the channels dredged and completed under the project of 1896 was made.

PRESENT CONDITION OF IMPROVEMENT.

Bay Ridge Channel has been dredged 800 feet wide and 26 feet deep at mean low water throughout its length; great quantities of mud from the shoal banks on either side of the channel, especially on the east side, have run into the deep water, and the available width of full 26 feet depth is now from 600 to 800 feet.

The triangular area was dredged to 26 feet depth, with maximum width of 900 feet, and Red Hook Channel to 26 feet depth and 400 feet width; both retain the depth fairly well except near the banks, where there is from 1 to 3 feet shoaling.

Red Hook Shoal, in Buttermilk Channel, was dredged 26 feet deep from the deep-water channel west of the shoal eastward to 50 feet from the bulkhead, a width of about 1,000 feet. The rapid current prevents any noticeable deposit in this channel except in the cut nearest to the bulkhead.

PROPOSED OPERATIONS.

Under the contract now in force it is expected that excavation will begin in October or November of this year and that it will be prosecuted continuously as appropriations are made by Congress until the entire project is completed.

ESTIMATE OF AMOUNT REQUIRED UNDER CONTINUING CONTRACT DURING THE FISCAL YEAR ENDING JUNE 30, 1902.

Under the terms of the contract the contractors were required to begin excavation within nine months from the date of approval of the contract. The contract was approved August 14, 1899, which fixes the time for beginning at May 14, 1900. The contractors found it necessary to build a new plant for this work, which is not yet completed, and excavation is therefore not yet begun. It is expected that a beginning will be made in October or November of the current year.

The contract requires a rate of excavation of not less than 300,000 cubic yards per month for ten working months of each year, the months of January and February not included. At this rate the amount of excavation required up to June 30, 1902, would be 6,460,000 cubic yards, which, at 10 cents per yard, the contract price, would amount to $646,000. This sum, less the amounts already appropriated, $362,000, is estimated as the amount which will be required under the contract up to June 30, 1902, $284,000.

Owing to the delay in construction of plant and in commencement of work, it is impossible yet to determine the efficiency of the contractors' plant or to make a more definite estimate of the funds which will be required.

These channels are in the collection district of New York, of which New York City is the port of entry. The nearest light-house is the statue of Liberty Enlightening the World, on Bedloes Island, about 1½ miles west. The nearest work of defense is Fort Columbus, Governors Island, New York.

Money statement.

BAY RIDGE, RED HOOK, AND BUTTERMILK CHANNELS.

July 1, 1899, balance unexpended	$54,145.53
June 30, 1900, amount expended during fiscal year	46,883.07
July 1, 1900, balance unexpended	7,262.46
July 1, 1900, outstanding liabilities	2,743.00
July 1, 1900, balance available	4,519.46

BAY RIDGE AND RED HOOK CHANNELS.

July 1, 1899, balance unexpended		$100,000.00
Amount appropriated by sundry civil act approved June 5, 1900		262,000.00
July 1, 1900, balance unexpended		362,000.00
July 1, 1900, outstanding liabilities	$6,166.67	
July 1, 1900, amount covered by uncompleted contracts	2,200,000.00	
		2,206,166.67
Amount (estimated) required for completion of existing project		2,138,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		284,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations for improving Bay Ridge and Red Hook channels, and the triangular area between them, and Buttermilk Channel, New York Harbor, have been made as follows:

For previous projects.

Application.	Date.	Amount.	
		Buttermilk Channel, including Buttermilk and Red Hook shoals.	Bay Ridge, Red Hook, and Gowanus Creek channels.
Dredging	June 14, 1880	$60,000	
Do	Mar. 4, 1881	60,000	$40,000
Do	Aug. 2, 1882	60,000	20,000
Do	July 5, 1884	10,000	5,000
Do	Aug. 5, 1886	56,250	7,500
Do	Aug. 11, 1888	100,000	60,000
Do	Sept. 19, 1890		160,000
Do	July 13, 1892	100,000	198,600
Do	Aug. 18, 1894	50,000	150,000
Total		496,250	641,100
Received from other sources		100	
Total		496,350	641,100

Total for previous projects, including dredging in Gowanus Canal, $1,137,450.

For present projects.

Application.	Date.	Amount.
Dredging	June 3, 1896	$200,000
Do	June 4, 1897	350,000
Do	July 1, 1898	130,000
Not yet expended	Mar. 3, 1899	100,000
Do	June 6, 1900	262,000
Total		1,042,000

Abstract of proposals for dredging Bay Ridge and Red Rock channels, New York Harbor, received in response to advertisement dated June 19, 1899, and opened July 19, 1899, by Maj. H. M. Adams, Corps of Engineers.

No. of bid.	Name and address of bidder.	Dredging about 20,405,400 cubic yards, scow measurement.		Remarks.
		Price per cubic yard.	Amount.	
		Per cent.		
1	Morris & Cumings Dredging Co	24¼	$4,948,309.50	Par. 10 of specifications not complied with.
2	Hughes Brothers & Bangs	10	2,040,540.00	Lowest bid accepted.

CONTRACT IN FORCE.

For excavating Bay Ridge and Red Hook channels, 1,200 feet wide and 40 feet deep at mean low water, removing 22,000,000 cubic yards, more or less, at 10 cents per cubic yard, measured in scows.

Name of contractor, Hughes Brothers & Bangs, of Syracuse, N. Y.; date of contract, July 31, 1899; date of approval, August 14, 1899; date for beginning work, May 14, 1900; expiration of contract, indefinite, depending upon appropriations by Congress.

Excavation not yet begun; contractors are building a new plant for this work.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

Freight received and shipped by water.

	Amount.	Estimated value.
Bay Ridge Channel (Sixty-ninth to Twenty-eighth street):	*Tons.*	
Receipts	505,000	$19,625,000
Shipments	138,250	13,225,000
Red Hook Channel (Henry street to Red Hook), no commerce reported except that of Erie Basin:		
Receipts	1,293,575	32,664,148
Shipments	1,358,000	40,810,000
Buttermilk Channel (Red Hook to Atlantic avenue):		
On channel piers—		
Receipts	2,464,730	60,439,545
Shipments	2,588,000	75,550,000
In Atlantic Basin—		
Receipts	5,654,270	195,898,278
Shipments	5,880,000	326,497,000
Total	19,881,825	764,708,971

Vessels, not including tugs or ferryboats.

	Number.	Draft.	Tonnage.
		Feet.	
Bay Ridge Channel (Sixty-ninth to Twenty-eighth street):			
Steam	283	5 to 26	50 to 3,150
Sail	214	6 to 24	75 to 2,000
Barges	3,909	5 to 12	100 to 800
Red Hook Channel, Erie Basin only:			
Steam	177	18 to 25	1,500 to 5,000
Sail	303	12 to 24	500 to 3,000
Barges	6,969		
Buttermilk Channel (Red Hook to Atlantic avenue, including Atlantic Basin):			
Steam	1,792	18 to 29	1,000 to 6,800
Sail	703	12 to 26	500 to 3,000
Barges	43,354		
Total	57,704		

The above includes only freights received and shipped at the docks. In addition, 2,721,280 tons of freight are reported passing through these channels to and from Gowanus Creek, carried in 11,241 vessels of 4 to 25 feet draft.

Other freights pass through these channels to various destinations, the amounts of which there is no means of estimating.

G 3.

IMPROVEMENT OF GOWANUS CREEK CHANNEL, NEW YORK.

Gowanus Creek was originally a tidal inlet in the southern part of the city of Brooklyn emptying into Gowanus Bay. This creek has been improved by the United States as part of the improvement of Gowanus Bay, and for the purpose of the improvement the Gowanus Creek Channel has been defined as extending from the junction of the Bay Ridge and Red Hook channels, opposite Henry street, Brooklyn, and Twenty-eighth street, South Brooklyn, eastwardly to the foot of Percival street, that part of the creek east of Percival street being called Gowanus Canal.

In 1880, before improvement by the United States, Gowanus Creek Channel had an available depth of about 11 feet at mean low water.

PROJECTS FOR IMPROVEMENT.

A survey of Gowanus Creek and Bay was made in 1880, and in 1881 a project for improvement was adopted providing for a channel in Gowanus Creek 18 feet deep at mean low water and 200 feet wide, which, with the Gowanus Bay channels, was estimated to cost $182,500. After the depth had been made, under the terms of the river and harbor act of 1888 the project was extended to provide for a depth of 21 feet at mean low water. This depth was made between the harbor lines on either side of the creek under the river and harbor act of 1892, and the project was completed. At the time of completion of the project $491,100 had been appropriated for and expended upon the several channels in Gowanus Bay. It is estimated that about $75,000 of this sum was applied to the Gowanus Creek Channel.

Under the river and harbor act of 1896, appropriating $25,000 for improving Gowanus Creek Channel, New York, by deepening the same to 26 feet at mean low water from the foot of Percival street to its junction with the Red Hook Channel, a project was adopted for making

Gowanus Creek Channel 26 feet deep at mean low water, at an estimated cost of $70,000.

The channel was dredged 26 feet deep for width of 125 feet in 1897.

Harbor lines for the part of New York Harbor including Gowanus Creek Channel were established by the Secretary of War March 4, 1890.

OPERATIONS DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

The river and harbor act of March 3, 1899, appropriating $25,000 for continuing this improvement, and after twice inviting proposals for dredging, the lowest bid received had been accepted with approval of the Secretary of War, dated June 28, 1899.

Under date of July 5, 1899, a contract was entered into with Henry S. Beard, of New York City, to do the required dredging at the rate of 14½ cents per cubic yard of material excavated, measured in scows; contract approved by the Chief of Engineers July 13, 1899; expiration under extension, August 11, 1900. Dredging under this contract was begun October 10, 1899, and at the close of the fiscal year was very nearly completed; 156,204 cubic yards of material had been excavated and deposited at the public dumping ground outside the harbor. The channel, previously dredged 26 feet deep at mean low water and 125 feet wide, was widened out to within about 15 feet of the lines joining the pierheads, making the width from about 250 feet at the southwest end to about 175 feet at the upper or northeast end of the channel.

PRESENT CONDITION OF IMPROVEMENT.

The channel has been dredged to 26 feet depth at mean low water for its full length and with width extending to within 15 feet of the pier lines on either side. It can not be widened to the pier lines without endangering the pierheads. The middle part, 125 feet wide, has shoaled about 3 feet by deposition of soft mud. The sides, recently dredged, retain the depth of 26 feet.

PROPOSED OPERATIONS.

The available funds will be applied under the existing contract to removing shoals at the outer end of the channel.

Further appropriations will be applied to removing these shoals throughout the channel.

Gowanus Creek is in the collection district of New York. The nearest light-house is the statue of Liberty Enlightening the World, on Bedloes Island, New York Harbor. The nearest work of defense is Fort Columbus, Governors Island, New York.

Money statement.

July 1, 1899, balance unexpended		$25,952.65
June 30, 1900, amount expended during fiscal year		18,599.55
July 1, 1900, balance unexpended		7,353.10
July 1, 1900, outstanding liabilities	$7,065.27	
July 1, 1900, amount covered by uncompleted contracts	260.89	
		7,326.16
July 1, 1900, balance available		26.94
Amount (estimated) required for completion of existing project		20,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		20,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

Appropriations for improving Gowanus Creek Channel, New York Harbor, were made as follows:

Application.	Date.	Amount.
For previous projects: Parts of the appropriations for Gowanus Bay channels, applied to Gowanus Creek, estimated to amount to about $75,000; dredging to 21 feet depth.	Mar. 3, 1881, to July 13, 1892.	$75,000
For the present project:		
Dredging 26 feet deep	June 3, 1896	25,000
Dredging 26 feet deep	Mar. 3, 1899	25,000
Total		125,000

CONTRACT IN FORCE DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

With Henry S. Beard, of New York City, for dredging about 160,000 cubic yards, at rate of 14½ cents per cubic yard, measured in scows. Date of contract, July 5, 1899; date of approval, July 13, 1899; date of beginning work, October 10, 1899; expiration of contract, June 11, 1900; extended to August 11, 1900; contract in progress.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1899.

Cargoes.	Tons.	Estimated value.
Receipts: Coal, lumber, steel, and general merchandise	179,300	$1,848,390
Shipments: Miscellaneous (estimated)	58,000	1,200,000
Total	237,300	3,048,390

Vessels engaged in above commerce.

Kinds of vessels.	Number.	Draft, loaded.	Tonnage.
		Feet.	*Tons.*
Steamers	740	6 to 25	75 to 1,800
Sail vessels	1,215	6 to 22	50 to 3,000
Barges, etc	3,110	5 to 12	200 to 1,400
Total	5,065		

The above refers to freight unloaded along Gowanus Creek, and is 21,948 tons more than reported for the year 1897. In addition to the above there was carried through Gowanus Creek, to and from Gowanus Canal, 2,041,980 tons of freight in 6,176 vessels of draft not exceeding 12 feet. Also 500,000 tons (estimated) of coal and lumber were taken into Columbia Basin, just inside the entrance of Gowanus Creek, there to be assembled in tows and dispatched to destinations.

No new lines of transportation are reported as established since July 1, 1899.

G 4.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

1. *Steamship Alvena.*—The British iron steamship *Alvena* sank in New York Harbor in the angle between Gedney and South channels, after collision with the steamer *British Queen*, January 19, 1897. She lay in about 25 feet depth of water, and was a serious danger to navigation.

A contract for removal of the wreck was entered into July 15, 1897, with John W. Chittenden, the work to be completed by November 24, 1897, at a cost of $36,000. On September 23, 1897, a supplementary agreement was entered into with the contractor, providing for sale to him of materials recovered from the wreck for $2,200, to be deducted from the contract price.

Under extension, the contract was completed November 3, 1898, but payment was delayed pending a decision of the Treasury Department upon the contractor's claims regarding a penalty clause in the specifications.

Payment for removal of the wreck was made in July, 1899, in accordance with the terms of a decision of the Comptroller of the Treasury, dated June 16, 1899.

CONTRACT IN FORCE DURING FISCAL YEAR ENDING JUNE 30, 1900, FOR REMOVAL OF WRECK OF STEAMSHIP ALVENA.

Name of contractor: John W. Chittenden.
Date of contract: July 15, 1897.
Date of approval: July 27, 1897.
Date of beginning work: August 4, 1897.
Expiration of contract under extension: November 24, 1898.

Articles of agreement supplementary to the above, providing for sale of materials recovered for the sum of $2,200, to be deducted from the contract price, dated September 23, 1897; authorized by the Secretary of War September 17, 1897.

2. *Barge David Crockett.*—The three-masted coal barge *David Crockett*, entering New York Harbor February 14, 1899, with a load of coal, grounded and sunk on the east end of Flynns Knoll, about 1 mile north of Sandy Hook, and in water from 15 to 20 feet deep. The cargo was partly removed by the owners and the barge abandoned.

The wreck lay outside the main channel and in a location where, being visible above high-water level, she was not a source of immediate danger to navigation, but she was liable to be broken up, particularly in winter, and to be carried into the main channel. The removal of the wreck was authorized June 6, 1899, work to be done during the more favorable summer months.

Under date of August 10, 1899, a contract for removal of the wreck was entered into with R. G. Packard; price, $6,750, less $1, the price bid for the wreck, cargo, and other materials recovered; date of approval of contract, August 25, 1899.

The contractor begun the work of removal in August and completed it October 12, 1899. The cargo was removed with a clam-shell dredge, and the hull was taken out with the same plant, blasting being used to break up such parts as could not be torn to pieces by the dredge. The final examination was made by sweeping the bottom with a long wire rope.

The material removed was deposited inside the harbor lines, at the contractor's yard, Bayonne, N. J.

CONTRACT IN FORCE DURING THE FISCAL YEAR ENDING JUNE 30, 1900, FOR REMOVAL OF WRECK OF COAL BARGE DAVID CROCKETT.

Name of contractor: R. G. Packard.
Date of contract: August 10, 1899.
Date of approval: August 25, 1899.
Date of beginning: August 21, 1899.
Date of completion: October 12, 1899.

Abstract of bids for removal of wreck of coal barge David Crockett in New York Harbor, opened July 28, 1899.

No.	Bidder.	Cost of removal of wreck.	Prices bid for wreck, cargo, etc.	Balance of cost.	Mode of removal.
1	R. G. Packard	*a* $6,750	$1	$6,749	Breaking into sections and pulling ashore at Bayonne, N. J.
2	Thomas Kivlin	12,000	375	11,625	Breaking her into pieces, removing her by largest derrick afloat, and placing her on private property.

a Lowest bid; accepted; contract entered into August 10, 1899.

Canal boat Daisy.—The canal boat *Daisy*, with cargo of coal, sank in New York Harbor on or before July 14, 1899, and when first reported lay on the east side of the main channel of the harbor, about 1½ miles below Castle Williams, Governors Island, in water 30 feet deep at low tide. Part of her cargo was removed by the owners and the wreck was abandoned. The least depth found upon the wreck was 19 feet at low tide.

An allotment was made for removal of this wreck, and after inviting proposals, the lowest offer received was accepted, being that of John F. Baxter, to remove the wreck for the sum of $519, and to pay for the boat, cargo, and materials recovered the sum of $40, to be deducted from price for removal. The contractor began work September 22, 1899, and after pumping out the coal, lifted the wreck bodily, and on November 13 grounded it at high water on his private property behind the bulkhead lines at Weehawken, N. J.

Abstract of bids for removal of wrecked canal boat Daisy, in New York Harbor, opened September 18, 1899.

No.	Bidder.	Cost of removal of wreck.	Prices bid for removal of cargo, etc.	Balance of cost.	Time of beginning.
1	John F. Baxter *a*	$519.00	$40.00	$479.00	4 or 5 days.
2	Merritt & Chapman Derrick and Wrecking Co.	625.00	25.00	600.00	10 days.
3	R. G. Packard	744.00	1.00	743.00	Do.

a Lowest bid accepted.

4. *Wreck off the Battery, New York Harbor.*—In September, 1899, a wreck was reported by the United States Coast and Geodetic Survey, lying on the north side of the channel abreast of South Ferry Slip, near the Battery, New York Harbor. The least depth found on the wreck was 16½ feet, and the depth of the surrounding bottom was about 30 feet.

An allotment for removal of the wreck was made and proposals for the work were invited. The lowest offer received was accepted, being that of the Merritt & Chapman Derrick and Wrecking Company to remove the wreck entire for $584, and to purchase the wreck and any material recovered for $25. The wreck was lifted from the bottom in October and towed to the contractors' dock at Stapleton, Staten Island, where the cargo of anthracite coal was removed; on November

18 the wreck was finally disposed of by taking it to sea and sinking it in water 80 feet deep about 2 miles southwest of Scotland Light-ship. The wreck was water-logged and very heavy; the stern was lifted to the water's edge by derricks but no name was visible. The wreck had been sunk so long that the paint had disappeared and no name or other mark was found by which the vessel could be identified.

Abstract of bids for removal of wreck off the Battery, New York Harbor, opened October 2, 1899.

No.	Bidder.	Price for removal.	Price for wreck and material.	Balance of price.
1	International Wrecking, Salvage, and Submarine Co	$805.00	$50.00	$755.00
2	Baxter Wrecking Co.	800.00	50.00	750.00
3	Merritt & Chapman Derrick and Wrecking Co. *a*	584.00	25.00	559.00

a Lowest bid; accepted.

5. *Schooner Penokee.*—The three-masted schooner *Penokee*, with cargo of coal from Norfolk, Va., for Saco, Me., while trying to make harbor during a storm, September 11, 1899, struck on Romer Shoal, drifted across and sank on the southwest side of Swash Channel, New York Harbor, in water 25 feet deep.

After inviting proposals, the two lowest bids received were rejected with approval of the Chief of Engineers, and the next lowest was accepted, being that of the Merritt & Chapman Derrick and Wrecking Company, to remove the wreck for the sum of $6,200, and to purchase the vessel and materials recovered for $1,500. A contract for the work was entered into October 24, 1899, and on November 14, 1899, the vessel and contents were lifted bodily and towed to the contractors' yard at Stapleton, Staten Island. The cargo was removed and the vessel was found to be in such condition as to admit of repair for freighting purposes.

Abstract of proposals for removal of wrecked schooner Penokee in New York Harbor, opened October 6, 1899.

No.	Bidder.	Price of removal.	Offer for purchase, etc.	Balance.	Mode of removal.
1	International Wrecking, Salvage and Submarine Co.	$1,290	$100	*a* $1,190	Blasting and removing in parts.
2	Merritt & Chapman Derrick and Wrecking Co.	6,200	1,500	*b* 4,700	Lifting and removing intact.
3	R. G. Packard	5,900	1	5,899	Remove cargo and lift hull bodily.
4	Chas. W. Johnstone	2,935	....	*a* 2,935	Blow to pieces and raise débris with diver and steam derrick.

a Rejected by authority of the Chief of Engineers, on account of mode of removal by blowing to pieces.
b Accepted.

ABSTRACT OF CONTRACT FOR REMOVAL OF WRECK OF SCHOONER PENOKEE IN NEW YORK HARBOR, IN FORCE DURING THE FISCAL YEAR ENDING JUNE 30, 1900.

Name of contractor: The Merritt & Chapman Derrick and Wrecking Company.

Date of contract: October 24, 1899. Date of approval: November 4, 1899. Date of beginning: Immediately on approval of contract. Date of completion of work: November 14, 1899.

6. *Obstruction in Gedney Channel, New York Harbor.*—On October 26, 1899, during an examination of this channel an obstruction was found with least observed depth of 23.2 feet at mean low water, lying about 275 feet south-southeast from buoy E 4. This being in the deep channel way was considered a possible source of very serious danger. Arrangements were made for its immediate removal, and on November 7 the first day of still water, the obstruction was raised by the Merritt & Chapman Derrick and Wrecking Company and placed upon their dock at Stapleton, Staten Island. It was found to be the engine. boiler, and shaft of a tugboat, the woodwork (except small pieces covered with coral) being wholly eaten up by teredos. It is believed that the obstruction was the remains of the tugboat *Farrell*, which was run down by a bark and sunk in that vicinity about twenty-five years ago. The location was one where the original depth was over 30 feet and where no dredging had been required.

G 5.

MODIFICATION OF HARBOR LINES ON WESTERN SIDE OF NEW YORK BAY, FROM COMMUNIPAW TO CONSTABLE POINT (JERSEY FLATS), OPPOSITE GREENVILLE, NEW JERSEY.

Pennsylvania Railroad Company, General Office,
Philadelphia, April 11, 1900.

Dear Sir: The Pennsylvania Railroad Company has under contract some very extensive improvements on the western side of New York Bay, opposite Greenville, for the purpose of increasing their terminal facilities for New York Harbor, but in making up our plans for the development of this property we find that the length available for a storage yard behind the bulkhead line, as now established, is too short in proportion to the length of piers that we would be allowed to build between the bulkhead line and the pierhead line.

I would, therefore, on behalf of the Pennsylvania Railroad Company, ask you to have the New York Harbor Line Board reconsider their plan for this purpose, and move the exterior line for solid filling, or the bulkhead line, about 2,000 feet farther east than it is to-day, very near the old line that was established by the riparian commissioners of the State of New Jersey in 1883.

If this can be done it will give us a much better terminal location than can otherwise be carried out, and in conversation with some of the neighboring owners of adjoining rights we find that they are all willing to have this done if the United States Engineers can see their way clear to do so. Our engineers, who have studied the subject carefully, are of the opinion that it will not be any detriment to the harbor to move the bulkhead line out as suggested.

Yours truly,

A. J. Cassatt, *President*.

Hon. Elihu Root,
Secretary of War.

[Second Indorsement.]

OFFICE OF CHIEF OF ENGINEERS,
U. S. ARMY,
April 21, 1900.

Respectfully referred to Col. Henry M. Robert, Corps of Engineers, president New York Harbor Line Board, for consideration and report. To be returned.

By command of Brig. Gen. Wilson:

A. MACKENZIE,
Lieut. Col., Corps of Engineers.

REPORT OF THE NEW YORK HARBOR LINE BOARD.

THE BOARD OF ENGINEERS,
New York City, May 18, 1900.

GENERAL: In compliance with your indorsement, dated April 21, 1900, the New York Harbor Line Board has considered the application to the Secretary of War by the Pennsylvania Railroad Company, dated April 11, 1900, for a change in the established harbor lines on the western side of Upper New York Bay opposite Greenville, N. J., commonly known as the "Jersey Flats."

A public hearing in this matter was given by the Board on May 14, 1900, which was well attended. This hearing was advertised in the public press, and, in addition, all parties interested, so far as their addresses could be ascertained, were requested to attend by individual invitation. The stenographer's notes of the hearing accompanies this report, marked "A."[1]

No opposition to the application was developed at the hearing further than a protest that it should not be granted to the injury of the navigable channels of the port. A full history of the locality is given in the Annual Report of the Chief of Engineers for 1891, Part I, page 965, and will not be repeated here. It suffices to say that the harbor lines now sought to be changed were originally established along the Jersey Flats, from Communipaw to Constable Point, by the riparian commission of New Jersey in 1883, and some submerged lands were sold or leased by the State of New Jersey in accordance with this establishment.

At the hearing the representative of the Pennsylvania Railroad Company stated that the company acquired riparian rights on this front in 1887, but had not begun improvements when the harbor line board for "New York Harbor and its adjacent waters" was constituted under the act of August 3, 1888.

In 1890 the Harbor Line Board took up the subject of establishing harbor lines along the Jersey Flats, and after many public hearings were had submitted a report, dated June 9, 1891, in which it is argued that the lines previously adopted by the State of New Jersey encroached too much upon the navigable waters of the harbor and recommended to the Secretary of War for adoption certain other lines which, in their judgment, better "preserved" those waters. The language of the report is:

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[1] Not printed.

> The bulkhead line now submitted for adoption diminishes the tidal prism of the harbor by 350,000,000 cubic feet, which is the most that the Board think can be safely authorized without the risk of changing those tidal conditions which serve to maintain the existing improved depths at the entrance across the bar.

In this latter system, the bulkhead line, or the line limiting solid filling, in the southern half of the flats, was drawn in a mean distance of 2,000 feet, but owing to the shoalness of water over the flats and the great distance to the main channel, the pierhead line was extended outward a mean distance of 2,000 feet. The two systems were more nearly coincident in the northern half. No modification has been made in these lines since 1890. The Pennsylvania Railroad Company now asks, substantially, that the *bulkhead line* established by the riparian commission of New Jersey in 1883 be reestablished in lieu of the one established by the War Department in 1891. It is to be remarked that this water front for the intervening ten years has remained practically dormant, and no improvements have been started having for their object the development of the property or the extension of the receiving and shipping facilities of the port. The Board has no opinion to express upon the cause of this apathy. In the meanwhile, the navigable channels within the harbor and over the bar have been greatly enlarged and deepened by the Government, beyond the dimensions maintained by the tides, to meet the increasing demands of commerce, and a project is now under contract to still further enlarge these channels, especially at the entrance. In these projects no control of the tidal flow is contemplated, but channels are to be made and maintained by dredging. Indeed, contracting works at the entrance are not desirable.

In the opinion of the Board the time has arrived when concessions should be made in the restrictions heretofore governing the utilization of the Jersey Flats, in order that this great water front, easily accessible by land and water to the city of New York, may be thrown open to development, particularly for the service of railroads connecting with coastwise and trans-Atlantic steamers and having their termini on the west shore. The most important question to be determined by the Board was whether the loss of tidal prism caused by the filling in of about 600 acres of submerged lands, which the granting of the application would allow, would injuriously affect the depth of water "maintained" by natural forces on the bar at the southern entrance. The Board has given this matter careful attention, and finds that the loss in tidal prism by granting the application of the railroad company will be less than one-half of 1 per cent of the total prism. This quantity may be safely abstracted, in the opinion of the Board, without injury to the navigable interests of the port. The increasing commerce of the port demands that these flats should be made capable of profitable, convenient, and necessary commercial uses. It is expected that in future, as at present, dredging will be required to keep open channels leading to the sea deeper and wider than may be maintained by natural tidal flow, the amount of which dredging will not be materially increased, if at all, by the effects of the proposed diminution in the tidal prism. The Board does not take the ground that the proposed filling of the flats will not theoretically diminish the scouring results of the tidal flow, but that the injury from this cause is estimated to be so small that the shore development may well be allowed notwithstanding, compensation by dredging being made for such slight deterioration as may take place in the navigable channels.

In considering the effects of the tidal flow in maintaining channels over the outer bar at New York the peculiar formation of the tidal basins here must be held in mind. The harbor is divided into two great tidal reservoirs, the Upper Bay and tributary waters and the Lower Bay, and it is the bar at the wide mouth of the Lower Bay that is to be improved in depth. The two basins have the relation of reservoirs connected by narrow channels, and the effect of the tidal flow on the outer bar is differentiated and diminished by the reservoir action of the Upper Bay to such an extent that the proposed reduction of one-half of 1 per cent in the tidal prism has still less effect on the outer bar than indicated by this percentage.

These extensive submerged flats, adapted to much-needed piers, wharves, and storehouses, and conveniently located, should not be unnecessarily held useless by oppressive restrictions, to the injury of this port, but their uses should be allowed to the extent now recommended, and therefore the channels should be maintained by dredging of dimensions adequate to the commerce of the port, the cost of which dredging in the case considered may be kept down to very moderate limits by modern methods of engineering.

The Board therefore recommends that the interior line of solid filling established by the riparian commission of New Jersey in 1883, extending from Communipaw to Constable Point, be adopted by the Secretary of War as the United States bulkhead line. The establishment of this line will grant the application of the Pennsylvania Railroad Company.

The following is a general description of the lines recommended for adoption in this report:

Beginning at a point on the bulkhead line, approved by the Secretary of War March 4, 1890, on the southerly side of the dock belonging to the Central Railroad of New Jersey, 300 feet east of the easterly side of Hudson street, Jersey City, prolonged southerly; thence westerly a distance of 249.9 feet measured on an arc of a circle drawn to a radius of 200 feet; thence southwesterly 4,214.8 feet along an arc with a radius of 4,900 feet; thence southerly 5,290 feet along a tangent bearing S. 42° 56′ W.; thence westerly 1,884.96 feet along an arc with radius of 1,800 feet; thence northwesterly 115.4 feet along a tangent bearing N. 77° 04′ W.; thence southerly 1,884.96 feet along an arc with a radius of 1,800 feet; thence southerly 8,736 feet, more or less, along a tangent bearing S. 42° 56′ W.; thence southeasterly 1,943.07 feet along an arc with a radius of 1,800 feet; thence southeasterly 875.42 feet along a tangent bearing S. 18° 55′ E.; thence southerly 977.46 feet along an arc with a radius of 688.16 feet to the northeast terminal point on the bulkhead line at Constable Point, approved by the Secretary of War January 4, 1890.

The modifications of the bulkhead lines herein recommended are shown on a tracing[1] which accompanies this report.

Respectfully submitted.

HENRY M. ROBERT,
Colonel, Corps of Engineers.
G. L. GILLESPIE,
Colonel, Corps of Engineers.
W. L. MARSHALL,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

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[1] Not printed.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
May 23, 1900.

Respectfully submitted to the Secretary of War.

The New York Harbor Line Board, having had under consideration an application from the Pennsylvania Railroad Company for a change in the established bulkhead line on the western side of Upper New York Bay, opposite Greenville, N. J., commonly known as the "Jersey Flats," submits the within report, to which attention is respectfully invited.

The board has held a public hearing, at which all interested parties were afforded an opportunity to be heard, and, after careful consideration of all the questions involved, recommends that the "interior line of solid filling, established by the riparian commission of New Jersey in 1883, extending from Communipaw to Constable Point, be adopted * * * as the United States bulkhead line."

The line thus recommended is described in the within report and exhibited in red on the accompanying tracing, and the modification in the existing line made thereby is that desired by the Pennsylvania Railroad Company.

For the reasons stated by the board I recommend that the modification be approved, and that the Secretary place his approval on this report and upon the tracing, both of which have been prepared for his signature.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Second indorsement.]

WAR DEPARTMENT,
May 24, 1900.

The modification herein recommended by the New York Harbor Line Board in the bulkhead line on the west shore of Upper New York Bay, from Communipaw to Constable Point, New Jersey, is approved.

ELIHU ROOT,
Secretary of War.

APPENDIX H.

IMPROVEMENT OF RIVERS AND HARBORS IN VERMONT, OF NARROWS OF LAKE CHAMPLAIN, NEW YORK AND VERMONT, OF HUDSON RIVER, NEW YORK, AND HARBORS THEREON, AND OF RIVERS AND HARBORS IN NORTHEASTERN NEW JERSEY.

REPORT OF COL. J. W. BARLOW, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Burlington Harbor, Vermont.
2. Otter Creek, Vermont.
3. Narrows of Lake Champlain, New York and Vermont.
4. Hudson River, New York.
5. Saugerties Harbor, New York.
6. Rondout Harbor, New York.
7. Peekskill Harbor, New York.
8. Passaic River, New Jersey.
9. Channel between Staten Island and New Jersey.
10. Elizabeth River, New Jersey.
11. Raritan River, New Jersey.
12. South River, New Jersey.
13. Raritan Bay, New Jersey.
14. Matawan Creek, New Jersey.
15. Keyport Harbor, New Jersey.
16. Shoal Harbor and Compton Creek, New Jersey.
17. Shrewsbury River, New Jersey.
18. Manasquan (Squan) River, New Jersey.
19. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEYS.

20. Saugerties Harbor, New York.
21. Tarrytown Harbor, New York.
22. Arthur Kill, or Staten Island Sound, New York and New Jersey.
23. Passaic River, New Jersey.
24. Woodbridge Creek, New Jersey.

United States Engineer Office,
New York City, July 10, 1900.

General: I have the honor to forward herewith annual report upon works of river and harbor improvements in my charge for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

H 1.

IMPROVEMENT OF HARBOR AT BURLINGTON, VERMONT.

The improvement of this locality consists in forming an artificial harbor in front of the city by constructing a breakwater about 1,000 feet from the shore.

A description of the locality and a history of the work done can be found in the Annual Report of the Chief of Engineers for 1897, pages 3296 and 3297.

No work was done on the breakwater during the present year, but a contract was entered into for building a concrete superstructure on a portion of it. This contract did not become in force until after the low-water season was over and winter had set in. The work will be taken up as soon as the level of the water in the lake will permit, and the available funds will be expended before the close of the present working season.

Money statement.

July 1, 1899, balance unexpended	$15,172.44
June 30, 1900, amount expended during fiscal year	167.25
July 1, 1900, balance unexpended	15,005.19
July 1, 1900, amount covered by uncompleted contracts	12,500.00
July 1, 1900, balance available	2,505.19
Amount (estimated) required for completion of existing project	215,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	50,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—	
July 4, 1836	$10,000.00
March 3, 1837	10,000.00
July 7, 1838	50,000.00
June 11, 1844	10,000.00
August 30, 1852	10,000.00
May 19, 1864	308.00
June 28, 1864	13,500.00
June 23, 1866	27,672.20
March 2, 1867	80,000.00
July 11, 1870	25,000.00
March 3, 1871	30,000.00
June 10, 1872	30,000.00
March 3, 1873	25,000.00
June 23, 1874	25,000.00
March 3, 1875	25,000.00
August 14, 1876	$20,000.00
June 18, 1878	20,000.00
March 3, 1879	15,000.00
June 14, 1880	10,000.00
March 3, 1881	10,000.00
August 2, 1882	12,000.00
July 5, 1884	50,000.00
August 5, 1886	18,750.00
August 11, 1888	35,000.00
September 19, 1890	20,000.00
August 18, 1894	10,000.00
June 3, 1896	10,000.00
March 3, 1899	15,000.00
Total	617,230.20

NOTE.—In 1872, $6,669.13 was carried to surplus fund and not expended.

Abstract of proposals for repairing breakwater at Burlington, Vt., received in response to advertisement dated July 8, 1899, and opened August 8, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York, N. Y.

No.	Name and address of bidder.	Removing old superstructure, 550 linear feet (per linear foot).	Dressed stone footing blocks, 11,875 cubic feet (per cubic foot).	Concrete footing blocks, 11,875 cubic feet (per cubic foot).	Concrete laid in place, 680 cubic yards (per cubic yard).	Hemlock timber and plank, 60,000 feet B. M. (per 1,000 feet B. M.).	Stone filling, 1 yard nominally (per yard).	Total, using dressed stone footing blocks.	Total, using concrete footing blocks.
1	David V. Howell, New York, N. Y.	$2.88	$0.58	$0.36	$7.98	$26.00	$2.60	$15,170.50	$12,668.00
2	George A. Rogers, Plattsburg, N. Y.	8.27	.46	.41	9.47	27.50	6.78	17,877.38	17,308.63

Abstract of proposals for repairing breakwater at Burlington, Vt., received in response to advertisement dated August 29, and opened September 29, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York City.

No.	Name and address of bidder.	Removing old superstructure, 550 linear feet.	Stone footing blocks, 420 cubic yards.	Concrete footing blocks, 420 cubic yards.	Concrete, 680 cubic yards.	Hemlock timber and plank, 60,000 feet B. M.	Total, using dressed stone footing blocks.	Total, using concrete footing blocks.
1	Robert H. Rogers, Plattsburg, N. Y	$9.00	$19.00	$19.00	$9.00	$30.00	$20,860.00	$20,850.00
2	David V. Howell, New York City	7.18	12.50	9.28	8.18	25.00	16,261.40	14,909.00
3	William James Daly, Ogdensburg, N. Y	8.00	10.00	8.50	7.50	30.00	15,500.00	14,870.00

CONTRACT IN FORCE.

Contract with William James Daly, of Ogdensburg, N. Y., dated October 26, 1899, for repairing breakwater, work to commence on or before December 1, 1899, and to be completed on or before October 31, 1900. Approved by the Chief of Engineers on November 14, 1899.

COMMERCIAL STATISTICS.

Vessels employed in trade.

Class.	Number.	Registered tonnage.	Trips made.
Steam	22	18 to 1,150	400
Sail	10	57 to 96	86
Canal boats and barges	285	60 to 175	897

Greatest length, 196 feet; greatest draft, 10 feet.

Freight handled.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Coal	44,597	43,352	39,236
Lumber and timber	86,342	86,702	23,334
Stone, gravel, and sand	2,079	11,281	8,249
General merchandise	26,162	25,192	16,811
Total	109,180	116,527	87,630

Passengers carried, 138,096.

H 2.

IMPROVEMENT OF OTTER CREEK, VERMONT.

This improvement was undertaken in order to give Vergennes a water route to Lake Champlain, the dimensions of the channel to be 8 feet deep and 100 feet wide.

A channel of this depth, but only 40 feet wide, has been made; its dimensions, however, have decreased on account of shoaling during time of freshets. A detailed statement of the work heretofore done may be found in the Report of the Chief of Engineers for 1897, page 3299.

During the present year the available funds, $1,000, were expended under a contract with William James Daly, of Ogdensburg, N. Y., and were used in the removal of 421 tons of loose rock from in front of the nail company's dock at Vergennes, where a depth of 8 feet was made over an area of 40 feet by 56 feet, and in dredging in front of the steamboat wharf, where three cuts of 150 feet each and one of 45 feet were made, each having an average width of 22 feet and depth of 8 feet; the amount of material taken out was 1,915 cubic yards. This work has restored the channel in front of the town to a fairly good condition, and has facilitated the handling of boats at the wharves.

The price paid for dredging was 25 cents per cubic yard, and for removing loose rock $1 per ton of 2,000 pounds.

Money statement.

July 1, 1899, balance unexpended	$1,000.00
June 30, 1900, amount expended during fiscal year	1,000.00
Amount (estimated) required for completion of existing project	11,248.00
Amount that can be profitably expended in fiscal year ending June 30, 1902	5,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

By act of—		By act of—	
June 10, 1872	$10,000	September 19, 1890	$5,000
March 3, 1875	5,000	July 13, 1892	10,000
June 18, 1878	8,000	August 18, 1894	5,000
March 3, 1879	5,000	June 3, 1896	5,000
June 14, 1880	2,000	March 3, 1899	1,000
March 3, 1881	2,000		
August 2, 1882	2,000	Total	62,500
August 11, 1888	2,500		

Abstract of proposals for removing rock and dredging in Otter Creek, Vermont, received in response to advertisement dated July 8, and opened August 8, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York, N. Y.

No.	Name and address of bidder.	Removing loose rock (per ton of 2,000 pounds).	Blasting and removing fixed rock (per cubic yard).	Dredging sand, gravel, mud, etc. (per cubic yard).
1	Willard Johnson, Fulton, N. Y	$1.50	$18.00	$0.58
2	William James Daly, Ogdensburg, N. Y	1.00	6.00	.25
3	George A. Rogers, Plattsburg, N. Y	9.87	24.00	.97

COMMERCIAL STATISTICS.

Vessels engaged in trade.

Class.	Number.	Tonnage.	Draft.
			Feet.
Steam	5	18 to 240	5 to 8
Canal boats and barges	35	142 to 150	5 to 7

Freight handled.

Articles.	1896.	1897.	1899.
	Tons.	*Tons.*	*Tons.*
Coal	5,000	5,000	4,700
Lumber	2,352	1,080	600
Iron	800	1,050	900
Kaolin	450	300	500
General merchandise	450	250	500
Total	9,052	7,680	7,200

H 3.

IMPROVEMENT OF NARROWS OF LAKE CHAMPLAIN, NEW YORK AND VERMONT.

This improvement consists in widening and deepening the channel from Whitehall, N. Y., the northern terminus of the Champlain Canal, to Bensons Landing, Vt., a distance of 15 miles.

Under various appropriations a depth of 12 feet in this channel has been made, with a width of 150 feet, but during suspension of work a shoaling occurred until there was only about 10 feet available for navigation.

Work during the present year has consisted in redredging the shoal places in Kenyons Bay, opposite Pulpit Point, and near the south end of the Narrows, under a contract entered into with William James Daly, of Ogdensburg, N. Y.

At Kenyons Bay a cut 1,450 feet long by 20 feet wide, with an additional cut 200 feet long and 20 feet wide alongside of it, was made on the Vermont side of the channel, near Beacon No. 1, and a cut 100 feet long by 20 feet wide was made on the opposite side of the channel; a cut 1,600 feet long by 20 feet wide was made on the Vermont side of the channel, above Light No. 4, and at the Narrows a cut 375 feet long by 20 feet wide was made one-half mile north of Light No. 8, the total amount of material removed being 40,020 cubic yards.

This work restored the channel to a depth of 12 feet throughout, but not to the required width, 150 feet; still it enabled boats of greater draft to navigate the Narrows.

In addition, booms were ordered placed at and opposite Puts Rock, in order to prevent vessels from colliding with the rocky bluffs at those points. These booms have been completed and placed in position.

The price paid for dredging was 20 cents per cubic yard, and the cost of the booms $660.

Money statement.

July 1, 1899, balance unexpended	$5,000.00
June 30, 1900, amount expended during fiscal year	4,925.91
July 1, 1900, balance unexpended	74.09
Amount (estimated) required for completion of existing project	17,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	17,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—

August 5, 1886	$30,000
August 11, 1888	15,000
July 13, 1892	18,500
March 3, 1899	5,000
Total	68,500

Abstract of proposals for dredging at Narrows of Lake Champlain, New York and Vermont, received in response to advertisement dated July 8, and opened August 8, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York, N. Y.

No.	Name and address of bidder.	Price per cubic yard for dredging.
		Cents.
1	Willard Johnson, Fulton, N. Y	36
2	William James Daly, Ogdensburg, N. Y	20
3	George A. Rogers, Plattsburg, N. Y	97

COMMERCIAL STATISTICS.

Amount of freight passing through the Narrows of Lake Champlain.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Timber and lumber	93,181	100,806	134,496
Pulp, wood	148,183	125,656	141,316
Salt	2,340	2,375	2,014
Sugar and molasses	2,354	152	1,839
Coal	156,604	159,558	218,480
Stone, lime, and clay	19,414	19,178	31,652
Iron ore	64,767	59,687	199,590
General merchandise	33,030	31,319	119,070
Total	519,873	498,731	848,457
Number of boats passing through the Narrows	3,724	3,485	5,502

H 4.

IMPROVEMENT OF HUDSON RIVER, NEW YORK.

The portion of this river now under improvement by the United States extends from the State dam at Troy downstream to Coxsackie. The object is to provide navigation with a 12-foot channel 150 feet wide from the State dam to the foot of Jacob street, Troy; thence gradually increasing in width to 400 feet at the foot of Broadway, Troy; thence 400 feet wide to Coxsackie. Below this latter point there is ample depth and width of channel.

The Report of the Chief of Engineers for 1885, page 677 et seq., contains a history of this work, accompanied by original reports and two sketches showing its condition at that time.

The report of the Board of Engineers who formulated the present project is contained in the Report of the Chief of Engineers for 1892, page 750 et seq.

WORK DONE DURING THE PRESENT FISCAL YEAR.

At the beginning of the present fiscal year the following contracts were in force, viz:

Contract with Kirk, Driscoll & Co., dated September 16, 1898, for constructing and repairing dikes and for furnishing rubble and paving stone.

Contract with Kirk, Driscoll & Co., dated June 28, 1899, for the removal of rock and for dredging.

During the fiscal year the following contracts were entered into, viz:

With Mr. James Du Bois, dated April 10, 1900, for constructing and repairing dikes.

Under the contract with Kirk, Driscoll & Co. for constructing and repairing dikes, work was continued on the construction of a dike near Willow Island, opposite New Baltimore; on the repairs of New York State dikes near New Baltimore and Castleton; and of the Barren Island, Shad Island, Cedar Hill, Winnies, and Papscanee dikes, between New Baltimore and Albany; and on the delivery of paving stone for repairing the paving of Breaker Island revetment and Port Schuyler Dike. The contract was completed December 6, 1899, and the plant then withdrawn from the river.

Under the contract with Kirk, Driscoll & Co. for the removal of rock and for dredging, work was begun at Troy for the relief of navigation at the foot of, and both north and south of, Broadway, with one dredge on July 28 and was continued until November 29, when the dredge was laid up for the season; and two dredges between November 13 and 29, the latter being employed in removing the covering from the rock between Congress street and Broadway.

Two dredges were employed in front of Castleton to remove a bad shoal formed by an ice dam during the spring break up, one being placed on the work September 12 and the other September 13, until October 5, when they were transferred to New Baltimore Bar, whence one was finally withdrawn November 23 and the other transferred November 24 to foot of Broadway and withdrawn for the season November 29.

The work on the dredging was resumed in order to relieve navigation in front of Castleton April 18 with one dredge, a second being put on May 5 and continued until May 12, when both dredges were transferred to Coeymans, where another bad shoal was obstructing navigation. The number of dredges was increased to three May 17 and to four May 22; two were transferred to the Coeymans channel and all withdrawn on or before June 6, work being resumed in front of Castleton June 5 with one dredge, and since June 8 two dredges have been and are still employed. One dredge was placed June 8 on a bad shoal which had formed about three-quarters of a mile below Stuyvesant (Upper Kinderhook) Light, and after removing it was transferred to Bath Cross-over above Albany, where two dredges have been employed since June 27.

For the removal of rock a large drilling scow, fitted with three drills and a large boiler house, had been constructed and was placed on the work June 22. Some rock has been broken, but not enough work has been done yet to form an opinion as to the capacity of the plant.

Under the contract with James Du Bois, no work was done except to purchase and assemble material necessary for dike construction.

Under an agreement entered into with Richard Parrott, deliveries of stone were made in Small Island Dike, along the footing course of Overslaugh Dike No. 1, along the footing course of Overslaugh Dike No. 2, Patroons Island revetment, and Patroons Lower Island Dike.

The progress of the work done during the fiscal year may be summarized as follows:

CONSTRUCTION OF NEW DIKES.

One new dike, in process of construction at the beginning of the present fiscal year, was completed. This dike begins at a point on the New Baltimore Dike about 3,000 feet south of the Vivde Hook Light and runs in a southwesterly direction for about 400 feet at an angle of about 35 degrees from the direction of that dike to a point about 900 feet from the West Dike, and then parallel to the West Dike for about 800 feet to a point about 400 feet north of the Willow Island Light. This dike was built on the plan of a full dike, 12 feet wide from out to out of piling, the piling sawed off at mean high water, and is about 1,199 feet long. The cost was $11.925 per linear foot.

REPAIRS OF EXISTING DIKES.

The following dikes, the repairs of some of which were in progress at the beginning of the present fiscal year, were repaired by driving new piling, bolting new walings, and putting in tie-rods and rubblestone; rubble and paving stone were also furnished for the repairs of the paving of old dikes by hired labor, viz:

New Baltimore (New York State) Dike repaired for a distance of 3,451 feet, at $3 per linear foot.

Barren Island Dike repaired for a distance of 500 feet, at $3.88 per linear foot.

Shad Island Dike repaired for a distance of 1,292.3 feet, at $3.42 per linear foot.

Castleton (New York State) Dike repaired for a distance of 2,370.4 feet, at $3.14 per linear foot.

Cedar Hill Dike repaired for a distance of 500 feet, at $3.84 per linear foot.

Winnies Dike repaired for a distance of 1,000 feet, at $3.43 per linear foot.

Papscanee Dike, Section I, repaired for a distance of 799 feet, at $2.99 per linear foot.

Overslaugh Dike No. 1, 3 cubic yards of rubblestone and 111 cubic yards of paving stone, at $158.09.

Breaker Island revetment, 22 cubic yards of rubblestone and 112 cubic yards of paving stone, at $176.38.

Port Schuyler Dike, 428 cubic yards of paving stone, at $599.20.

Rubblestone for protecting footing of paved dikes and for filling old pile dikes was delivered at following dikes, viz:

	Quantity.	Cost.
	Cubic yards.	
Overslaugh Dike No. 2	803	$714.67
Beacon Island Dike	40	35.60
Overslaugh Dike No. 1	1,067	949.63
Patroons Lower Island Dike	280	249.20
Patroons Island revetment	124	110.36

The following quantities of materials for dike construction and repairs have been delivered in place, viz:

Pine piling	linear feet	78,512
Round timber	do	14,450
Square timber	feet B. M.	166,232
Tie-rods and screw bolts	pounds	103,826
Driftbolts and washers	do	33,185
Rubblestone	cubic yards	12,742
Quarry spawls	do	1,404
Paving stone	do	651

ROCK REMOVAL.

For the removal of rock, a scow has been equipped with three steam drills, the shifting power for drills and spuds being hydraulic, and is now on the reef between State street and Broadway, at Troy, N. Y., but no rock has yet been removed, though some blasting has been done.

DREDGING.

The following quantities have been dredged from the channel and the spoil disposed of, viz:

	Cubic yards.
Shoal near Stuyvesant	6,204
Willow Island Shoal	41,746
Coeymans Cross-over	15,585
Coeymans Channel	19,482
Castleton Bar	55,749
Bath Cross-over	5,791
Arsenal to Congress street, Troy	1,122
Congress street to Broadway	4,192
Broadway to Jacob street	27,847
Total	177,718

HIRED LABOR.

A master laborer and from 10 to 22 laborers were employed on repairs of paving of dikes during the month of July, the latter number being increased as the work required them until during the month of August there were 27. This number was reduced after September 30 to about 11 men, and all were discharged December 20, when the ice had become so heavy that no work could be done economically.

June 13, 1900, work was resumed on the repairs of the paving and the strengthening of footing of paved dikes above Albany, where the extraordinary breaking up of the ice had done some damage, and is still in progress.

HYDROGRAPHIC PARTY.

The hydrographic party has been employed making surveys and examinations of the channel between Coxsackie and the D. & H. Co.'s bridge at Troy, N. Y.; in sounding after dredging at Stuyvesant, Willow Island, Coeymans, Castleton, and between Broadway and the D. & H. Co.'s bridge at Troy, N. Y.; in sounding to develop reefs of rock between State street and foot of Broadway, Troy; in setting ranges and tide staffs for rock removal and for dredging; and in calculations.

MISCELLANEOUS.

During the fiscal year several snags and a submerged pontoon, which were brought down by the freshet in April and were menaces to navigation, were hauled out or broken up at New Baltimore, at a cost of $44.

Guide piles to mark the location of dikes near the channel, which being submerged during freshets are dangerous to navigation, have been driven since the opening of navigation, at a cost of $87.82.

GENERAL REMARKS.

The season of 1899 was a remarkable dry one, and for weeks very little water flowed over the State Dam at Troy; consequently the elevation of mean low water both at the dam and at the foot of Broadway, Troy, was very much lower than any previous determination of that plane, and slightly lower also at Albany. The range of the tides showed decided increase at foot of Broadway, Troy, and at the State Dam. The following table of tides has been compiled from the records kept at the station named, the elevation being above that of similar tides at Governors Island, New York. Reference is made to Report of Chief of Engineers for 1897, page 998, and for 1899, page 1295, for results of tidal observations of previous seasons.

Locality.	Elevation of mean low water.		Elevation of mean high water.		Mean rise and fall of tides.	
	1876.	1899.	1876.	1899.	1876.	1899.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Albany	2.43	2.31	0.39	0.73	2.32	2.81
Broadway, Troy	3.09	2.28	.63	.84	1.92	2.92
State Dam, Troy	4.58	3.11	.95	.76	.80	2.05

The above results show such a lowering of the plane of mean low water at the State Dam, without any dredging between the D. & H. Co.'s bridge and the dam, that it is evident that after the dredging is completed, under similar conditions as to rainfall, the elevation of that plane will be as low as it now is at the foot of Broadway, and the range of tides will be practically the same as at the foot of Broadway. A further widening of the channel of 12 feet depth between Albany and the foot of Broadway, Troy, may cause still further changes in the tidal phenomenon, but no great changes are anticipated.

At the close of navigation the latter part of December, 1899, so far as known, the channel between Coxsackie and Albany was as good as at the close of the fiscal year; and at Willow Island Shoal and in front of Castleton, where dredging had been done, it was very much better. February 13, 1900, the ice moved out from in front of Albany and there seemed to be little danger of a bad freshet, but it stopped running during the night, and by 7 a. m. of February 14 the water had risen at Albany to 20 feet above the mean low-water plane. Just above Stuyvesant and in front of Coeymans bad ice dams were formed, and from Roah Hook (just north of Coeymans) there were a succession of dams as far up as the Overslaugh. In front of Castleton, from Nine-mile Tree Light to Cedar Hill, the main channel was a mass of broken and piled-up ice, which did not move out until the last of March.

Soon after the opening of navigation, surveys were made at Coeymans Cross-over and in front of Castleton, and later about half a mile north of Stuyvesant. Bad shoals were found at all of these places, and in front of Castleton, for more than a mile, there were deep holes with shoals below having less than 7 feet over them at mean low water. Dredges were set at work at Castleton first, and after opening a channel were employed at Coeymans and above Stuyvesant. The shoals were removed at the two latter points, and dredges are still employed at Castleton.

The following table, compiled from soundings taken since the opening of navigation in the spring of 1900, shows the width and depth of the deepest navigable channel through the bars and shoals, as compared with those of 1899:

Locality.	1899.		1900.	
	Width.	Depth.	Width.	Depth.
	Feet.	*Feet.*	*Feet.*	*Feet.*
Stone House Bar	200	11.5	100	11.5
Willow Island Shoal	400	10.5	400	12
Coeymans Cross-over	....	....	330	12
Mulls Cross-over	220	11.5	80	11.5
Nine-mile Tree Cross-over	200	12	150	11
Castleton Bar	100	11	50	11.5
Cedar Hill Bar	60	12	80	11.5
Winnies Bar	80	11.5	250	11
Stone Light Shoal	60	11.5	130	11.5
Beacon Island Shoal	50	12	60	12
Bogart Light Shoal	50	11.5	80	11.5
Douws Point Cross-over	150	12	170	12
Cuyler Bar	100	12	70	12
Through draws of bridges, Albany	110	12	100	12
Bath Cross-over	200	10.5	200	10
Bath Shoal	160	12	120	12
Kellogg Shoal	140	12	100	12
Fishhouse Shoal	140	12	220	12
Round Shoal	70	12	60	12
Covills Folly	50	12	80	12
Opposite Breaker Island	100	12	130	12
Van Buren Bar	160	12	140	12
Washington Bar	200	12	150	12
Opposite Watervliet Arsenal	160	11.5	50	12
Arsenal to Congress street, Troy	200	12	100	12
Through draw, Congress Street Bridge	100	12	50	12
Congress street to Broadway, Troy	250	9	70	12
Broadway to State Dam, Troy	50	5.5	50	5.5

The above depths refer to the plane of mean low water established in 1876.

As shown by the above table, the channel from Coxsackie to Albany is generally 12 feet deep and more at mean low water, with a varying width of not less than 60 feet, but owing to ice gorges, even after the dredging already done this season, the through channel really has a greatest depth of 11 feet, the least width at that depth being 100 feet at Cedar Hill Bar.

Between Albany and the foot of Broadway, Troy, with the exception of Bath Crossover, where the depth is 10 feet for a width of 200 feet, there is a through channel 12 feet deep and more with a least width of 50 feet.

Between the foot of Broadway and the State Dam at Troy, N. Y., there has been no dredging except for a distance of about 400 feet above the former, and consequently no change in the width and depth of the navigable channel, which is about 50 feet wide with a depth of 5.5 feet.

The general condition of the dikes has been greatly improved by the repairs made during the seasons of 1898 and 1899. A number of old dikes in need of immediate repairs will be put in order during the present season under a contract already entered into with Mr. James Du Bois, of New York, and several new dikes will also be built; and it seems evident that, if the depth of 12 feet is to be maintained without dredging every spring, some additional new dikes will be needed to contract the present waterway at several bars below Albany, notably Stone House and Cedar Hill bars, and at Bath Shoal, above Albany, for which no provision has yet been made.

It is proposed, by making some slight changes in the plan of the timber work on the pile dikes, to try to avoid the necessity of frequent and expensive renewals of the piling, but no provision can be made against damage from ice which would not be so expensive that renewals would probably be more economical.

This improvement has been under the local charge of Mr. R. H. Talcott, assistant engineer, stationed at Albany.

The appropriation asked for during fiscal year ending June 30, 1902, is to be expended as follows:

One hundred thousand dollars under continuing contracts with Kirk, Driscoll & Co. for dredging and rock removal, and with James Du Bois for constructing and repairing dikes.

Three hundred thousand dollars under new continuing contracts for dredging, rock removal, and dike construction and repair, to be entered into for $1,364,567, which is the amount estimated as required to complete the project.

Money statement.

July 1, 1899, balance unexpended		$157,363.55
Amount appropriated by sundry civil act approved June 6, 1900		400,000.00
		557,363.55
June 30, 1900, amount expended during fiscal year		92,243.64
July 1, 1900, balance unexpended		465,119.91
July 1, 1900, outstanding liabilities	$11,067.77	
July 1, 1900, amount covered by uncompleted contracts	407,409.72	
		418,477.49
July 1, 1900, balance available		46,642.42
Amount (estimated) required for completion of existing project		1,364,567.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		400,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

By act of—	
June 30, 1834	$70,000.00
July 2, 1836	100,000.00
March 3, 1837	100,000.00
July 7, 1838	100,000.00
August 30, 1852	50,000.00
June 26, 1864, allotment	33,000.00
June 23, 1866	50,000.00
March 3, 1867	305,188.00
July 25, 1868, allotment	85,000.00
April 10, 1869, allotment	89,100.00
July 11, 1870	40,000.00
March 3, 1871	40,000.00
June 10, 1872	40,000.00
March 3, 1873	40,000.00
June 23, 1874	40,000.00
March 3, 1875	40,000.00
August 14, 1876	50,000.00
June 18, 1878	70,000.00
March 3, 1879	30,000.00
June 14, 1880	20,000.00

By act of—	
March 3, 1881	$15,000.00
August 2, 1882	10,000.00
July 5, 1884	30,000.00
August 5, 1886	26,250.00
August 11, 1888	75,000.00
September 19, 1890	150,000.00
July 13, 1892	187,500.00
March 3, 1893	500,000.00
August 18, 1894	145,000.00
March 3, 1895	500,000.00
June 11, 1896	480,000.00
June 4, 1897	475,000.00
July 1, 1898	160,406.56
March 3, 1899	100,000.00
June 6, 1900	400,000.00
Total	4,646,444.56
Received from other sources	792.57
Total	4,647,237.13

Abstract of proposals for constructing and repairing dikes in Hudson River, New York, received in response to advertisement dated March 5, 1900, and opened by Col. J. W. Barlow, Corps of Engineers, at New York City on April 5, 1900.

No.	Name and address of bidder.	Piles, 260,000 linear feet.	Sheet piling, 628,000 feet B. M.	Round timber, 23,400 linear feet.	Square timber (new work), 222,500 feet B. M.	Square timber (old work), 377,500 feet B. M.	Tie-rods and screw bolts (new work), 111,000 pounds.	Tie-rods and screw bolts (old work), 209,000 pounds.
1	Frank Pidgeon, 315 Madison avenue, New York, N. Y	$0.105	$33.00	$0.09	$35.00	$35.00	$0.035	$0.035
2	International Contracting Co., Syracuse, N. Y	.125	34.50	.115	37.00	40.00	.045	.05
3	James Du Bois, 11 Broadway, New York, N. Y	.0975	32.00	.085	32.00	32.00	.0375	.0375
4	Kirk, Driscoll & Co., Dunfee Building, Syracuse, N. Y	.104	34.00	.09	40.00	40.00	.046	.046
5	Philadelphia Construction Co., 515 Girard Building, Philadelphia, Pa	.15	42.00	.13	45.00	45.00	.07	.07
6	Wm. D. Fuller, New Baltimore, N. Y	.12	58.00	.10	45.00	48.00	.055	.055
7	Edward J. Hingston, Buffalo, N. Y	.18	26.00	.18	36.00	37.00	.05	.06

No.	Name and address of bidder.	Drift-bolts and washers, 99,000 pounds.	Rubble-stone, 28,000 cubic yards.	Quarry spalls, 1,700 cubic yards.	Paving stone, 8,700 cubic yards.	Dredged material, 15,700 cubic yards.	Dredge, fifty hours.	Total.
1	Frank Pidgeon, 315 Madison avenue, New York, N. Y	$0.035	$0.84	$0.70	$1.25	$0.15	$7.00	$124,085.00
2	International Contracting Co., Syracuse, N. Y	.04	1.00	.50	1.50	.20	20.00	145,634.50
3	James Du Bois, 11 Broadway, New York, N. Y	.0375	.80	.80	1.80	.20	9.00	121,007.50
4	Kirk, Driscoll & Co., Dunfee Building, Syracuse, N. Y	.04	.80	.65	1.50	.08	6.00	131,289.00
5	Philadelphia Construction Co., 515 Girard Building, Philadelphia, Pa	.06	1.15	.95	2.00	.18	10.00	178,299.00
6	Wm. D. Fuller, New Baltimore, N. Y	.055	1.30	.75	1.80	.40	25.00	182,006.50
7	Edward J. Hingston, Buffalo, N. Y	.045	1.00	.90	1.50	.25	8.50	158,792.50

CONTRACTS IN FORCE.

Continuous contract with Kirk, Driscoll & Co., of Syracuse, N. Y., dated June 28, 1899, for removal of rock and for dredging, work to commence on or before July 27, 1899, the available funds to be earned by June 30, 1901. Approved by the Chief of Engineers on July 12, 1899.

Continuous contract with James Du Bois, of New York City, dated April 10, 1900, for construction and repair of dikes, work to commence on or before May 12, 1900, the available funds to be earned by June 30, 1901. Approved by the Chief of Engineers on April 24, 1900.

COMMERCIAL STATISTICS.

The importance of the Hudson as a great waterway of commerce is apparent when it is known that, aside from its own local traffic, which in itself is very large, it absorbs all the traffic of the Erie, Champlain, and Delaware and Hudson canals, besides the great coal trade of the Pennsylvania Coal Company at Newburg and the Erie coal trade at Piermont.

The two principal industries on the river are ice and brick.

Amount of local commerce within limits of improvement.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
General merchandise	809,746	697,554	730,809
Grain, flour, feed, etc	944,806	737,978	482,510
Lumber and timber	861,740	565,538	995,840
Fuel	479,372	418,741	857,159
Building material	888,095	428,245	814,958
Ice	699,105	1,197,839	1,189,524
Total	3,682,864	4,045,895	5,070,800

Number of passengers carried in 1899, 1,278,000.

In addition to this local commerce through commerce amounting to more than 10,000,000 tons annually is carried down the river.

H 5.

IMPROVEMENT OF HARBOR AT SAUGERTIES, NEW YORK.

A history of this improvement may be found in the Report of the Chief of Engineers for 1895, page 910. The work was completed in 1892, at a cost of $42,000; subsequent expenditures have been applied to maintenance.

During the current year the only work found necessary was filling the dikes with rubblestone where a settlement had occurred; 392 cubic yards of rubblestone was used for that purpose, at a cost of 79 cents per cubic yard. An examination of the dikes disclosed the fact that they were in fair condition, but the superstructure has commenced to decay and will require renewal in a few years.

The river and harbor act of March 3, 1899, ordered an examination of Saugerties Harbor, with a view to extending the improvement toward the head of the harbor. At the time the report on the survey was submitted it was understood that the head of navigation was at the steamboat landing, and an estimate of cost was submitted for making a channel 12 feet deep and 300 feet wide at that point. Subsequently local interests requested that the channel be extended along the wharf front on the west side of the creek above the steamboat dock to within about 600 feet of a dam at the head of the harbor.

In order to ascertain the cost of continuing the improvement as desired, the necessary survey was made. As a result of this survey the following supplementary report is submitted, giving the cost of redredging the channel along the wharf front on the west side of the creek and of opening a channel from the steamboat dock to the rapids below the dam:

Probable cost of a channel 50 feet wide, 12 feet deep, and 500 feet long, in front of Sheffield & Sons' paper mills wharf:	
9,340 cubic yards dredging, at 25 cents	$2,335.00
Engineering and contingencies	235.00
Total	2,570.00

Probable cost of a channel 60 feet wide, 12 feet deep, and 2,100 feet long, from the steamboat dock to the rapids below dam:	
3,000 cubic yards dredging, at 35 cents	1,050.00
24,000 cubic yards rock removal, at $7	168,000.00
Engineering and contingencies	16,950.00
Total	186,000.00

Probable cost of a channel 60 feet wide, 8 feet deep, and 2,100 feet long, from the steamboat dock to the rapids below dam:	
3,000 cubic yards dredging, at 35 cents	1,050.00
10,000 cubic yards rock removal, at $7	70,000.00
Engineering and contingencies	7,150.00
Total	78,200.00

Probable cost of a channel 100 feet wide, 8 feet deep, and 2,100 feet long, from the steamboat dock to the rapids below dam:	
3,250 cubic yards dredging, at 35 cents	1,137.50
14,850 cubic yards rock removal, at $7	103,950.00
Engineering and contingencies	10,512.50
Total	115,600.00
Annual cost of maintenance estimated at	2,000.00

As a channel 60 feet wide and 8 feet deep at mean low water or 12 feet deep at mean high water would probably be large enough to accommodate navigation in the upper part of the creek, the following recapitulation is given as the probable cost of improving Saugerties Harbor, New York:

Estimated cost of a 12-foot channel, 300 feet wide, from the Hudson River to steamboat landing	$44,685.00
Estimated cost of an 8-foot channel, 100 feet wide, from steamboat dock to within 350 feet of Porter's dock, and thence 60 feet wide to rapids below dam	78,200.00
Estimated cost of a 12-foot channel, 50 feet wide, along the wharf front on the west side of creek above steamboat landing	2,570.00
Total	125,455.00
Estimated annual cost of maintenance	3,000.00

It is understood that a number of manufacturing interests have decided to locate along the banks of Esopus Creek, which comprises

Saugerties Harbor. This will add materially to the commerce of the harbor, and it would therefore seem only just that the channel be extended so that they will have ample facilities for shipping their products by water.

Money statement.

July 1, 1899, balance unexpended	$2,683.10
June 30, 1900, amount expended during fiscal year	533.10
July 1, 1900, balance unexpended	2,150.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	2,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—		By act of—	
July 5, 1884	$5,000	August 18, 1894	$5,000
August 5, 1886	15,000	June 3, 1896	2,500
August 11, 1888	12,000	March 3, 1899	2,500
September 19, 1890	10,000		
July 13, 1892	5,000	Total	57,000

COMMERCIAL STATISTICS.

Vessels employed in trade.

Class.	Number.	Tonnage.	Draft.
			Feet.
Steam	5	2,000	7
Canal	10	1,800	7 to 11

Passengers carried, 19,000.

Freight handled.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Bluestone	40,000	40,000	40,000
Coal	5,000	11,000	7,000
Building material	1,000	1,650	1,300
General merchandise	5,000	5,718	2,500
Total	51,000	58,368	50,800

H 6.

IMPROVEMENT OF HARBOR AT RONDOUT, NEW YORK.

The improvement of this harbor consists in widening and deepening Rondout Creek by means of dikes and dredging. Work began in 1872 and was completed in 1880, at a cost of $90,000, a channel depth of 14 feet having been secured. Since 1880 the expenditures have been applied to maintenance. A history of the work is printed in the Report of the Chief of Engineers for 1895, page 913.

During the current year work consisted in repairing the dikes where needed, under a contract entered into with William Parrott, of Newburg, N. Y., on October 10, 1899. The superstructure of the dikes was renewed where decay had taken place, and the stone filling was raised where settlement had occurred. The work had not been entirely completed at the close of the year.

The following quantities of material were used in making the repairs:

NORTH DIKE.

4,277 linear feet white-oak piling.
3,684 linear feet pine piling.
10,326 feet B. M. square timber.
3,503 pounds tie rods, drift bolts, etc.
407 linear feet wire rope.
100 cubic yards rubble stone.

NORTH BRANCH DIKE.

2,436 linear feet white-oak piling.
2,045 linear feet pine piling.
8,380 feet B. M. square timber.
3,614 pounds tie rods, drift bolts, etc.
144 linear feet wire rope.
126 cubic yards rubble stone.

SOUTH DIKE.

575 linear feet white-oak piling.
1,412 linear feet pine piling.
1,344 feet B. M. square timber.
436 pounds tie rods, drift bolts, etc.

The prices paid for the different materials in place were as follows:

White-oak piling, 19 cents per linear foot; pine piling, 11 cents per linear foot; square timber, $37 per 1,000 feet B. M.; iron, 4 cents per pound; wire rope, 5 cents per linear foot, and rubblestone, 85 cents per cubic yard.

Money statement.

July 1, 1899, balance unexpended		$4,675.80
June 30, 1900, amount expended during fiscal year		2,617.16
July 1, 1900, balance unexpended		2,058.64
July 1, 1900, outstanding liabilities	$1,520.11	
July 1, 1900, amount covered by uncompleted contracts	525.53	
		2,045.64
July 1, 1900, balance available		13.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		2,500.00

APPROPRIATIONS.

By act of—

June 12, 1872	$10,000
March 3, 1873	20,000
June 8, 1875, allotment	1,000
August 14, 1876	30,000
June 15, 1878	30,000
August 2, 1882	2,000
July 5, 1884	1,000
August 5, 1886	2,500
August 11, 1888	$5,000
September 19, 1890	5,000
July 13, 1892	5,000
August 18, 1894	5,000
June 3, 1896	2,500
Total	119,000

Abstract of proposals for repairing dikes at Rondout, N. Y., received in response to advertisement dated August 29, and opened September 29, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York City.

No.	Name and address of bidder.	Oak piling, 9,400 feet.	Pine or spruce piling, 3,000 feet.	Square timber, 19,000 feet.	Tie rods and screw bolts, 5,400 pounds.	Drift bolts and washers, 1,700 pounds.	Wire rope or chain, 1,080 feet.	Rubblestone, 400 cubic yards.	Total.
		Cents.	*Cents.*		*Cents.*	*Cents.*	*Cents.*	*Cents.*	
1	Richard Parrott, Newburg, N. Y.	18	11	$40.00	5	5	10	$0.70	$3,525.00
2	Frank Pidgeon, New York City	25	14	45.00	4	4	10	.85	4,357.00
3	William Parrott, Newburgh, N. Y.	19	11	37.00	4	4	5	.85	3,497.00
4	David V. Howell, New York City	18½	15	38.00	6½	6	{ 8 25 }	1.22	{ 3,988.40 4,122.00
5	James Du Bois, New York City	18	11	38.00	4¾	4½	10	.85	3,525.00

CONTRACT IN FORCE.

With William Parrott, of Newburg, N. Y., dated October 10, 1899, for repairing dikes, work to commence on or before November 6, 1899, and to be completed on or before July 18, 1900. Approved by the Chief of Engineers October 19, 1899.

COMMERCIAL STATISTICS.

Freight handled.

Articles.	1896.	1897.	1899.
	Tons.	*Tons.*	*Tons.*
General merchandise	900,000	900,000	600,000
Coal	380,250	385,000	250,000
Brick	290,000	280,000	275,000
Building stone	210,300	215,000	200,000
Cement, lime, and sand	512,500	510,000	500,000
Ice	40,000	40,000	60,000
Total	2,333,050	2,330,000	1,885,000

H 7.

IMPROVEMENT OF HARBOR AT PEEKSKILL, NEW YORK.

A description of the locality and a history of the work done can be found in the Report of the Chief of Engineers for 1897, page 1016.

During the present year work consisted in redredging the channel in front of the wharves to the depth of 10½ feet and width of 150 feet, and the southerly connection with the Hudson River to a depth of 10½ feet and width of 100 feet, also in dredging the northerly connection with the Hudson River to a depth of 10½ feet and width of 100 feet, under a contract entered into with John P. Randerson, of Albany, N. Y. The total amount of material taken out during the season was 102,344 cubic yards, at a cost of 8½ cents per cubic yard.

This work completed the project as originally adopted at about two-fifths of the estimated cost, this being possible owing to the low price secured for dredging at the last opening.

Since this work began the commerce in Peekskill Harbor has increased so much that a channel 100 feet wide and 10 feet deep is no longer considered adequate. Those principally interested ask that the channel along the wharf front be made 200 feet wide and the northerly and southerly connections 150 feet wide, with a depth of 15 feet at mean low water. These dimensions of channel can be obtained at no greater cost than was originally estimated for channels of less size, provided the cost of dredging is as low as that secured at the last letting. This is considered probable, and it is even possible that the price may be lower.

For the reasons stated it seems advisable to continue this improvement until channels of the larger dimensions have been secured, provided the cost does not exceed the original estimate.

Money statement.

July 1, 1899, balance unexpended	$9,877.26
June 30, 1900, amount expended during fiscal year	9,277.26
July 1, 1900, balance unexpended	600.00
Amount (estimated) required for completion of existing project	30,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	30,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—	
June 3, 1896	$10,000
March 3, 1899	10,000
Total	20,000

COMMERCIAL STATISTICS.

Freight handled.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
General merchandise	151,300	376,350	579,505
Building material	40,500	42,300	58,500
Iron ore and manufactured articles	60,000	94,000	140,950
Coal and wood	58,000	119,300	164,000
Lumber	44,500	83,000	124,500
Molding sand	50,000	20,000	25,000
Total	404,300	734,950	1,092,455

These freights were carried in steam and sail vessels, barges, and canal boats drawing from 5 to 12 feet of water.

H 8.

IMPROVEMENT OF PASSAIC RIVER, NEW JERSEY.

A description of this locality and a history of the work done can be found in the report of the Chief of Engineers for 1897, pages 1128 and 1129.

Work during the present year consisted in redredging the channel between the Plank Road and Center Street bridges at Newark and in dredging the Belleville Bar.

The dredging at Newark was done under a contract entered into October 10, 1899, with P. Sanford Ross, Incorporated, of Jersey City, N. J. Work began on November 11 and was completed December 15, 1899, during which time 27,555 cubic yards of material was removed, at a cost of 17½ cents per cubic yard. The channel between the Plank Road and Center Street bridges, a distance of 1,800 feet, was given a depth of 10 feet and width of 200 feet, the previous width having been 100 feet.

The work at the Belleville Bar was done under a contract entered into December 11, 1899, with Joseph Oliver Stokes, of New York City, to widen the channel at the Rutherford Park Bar, and to remove scattered bowlders and ledge rock between Belleville and Passaic. Work began April 19, but owing to inadequate plant and hard material, little progress had been made at the close of the year, the total amount of material removed being only 867 cubic yards of gravel and 3.23 cubic yards of bowlders.

Money statement.

July 1, 1899, balance unexpended	$14,941.67
June 30, 1900, amount expended during fiscal year	5,971.20
July 1, 1900, balance unexpended	8,970.47
July 1, 1900, amount covered by uncompleted contracts	8,500.00
July 1, 1900, balance available	470.47
Amount (estimated) required for completion of existing project	79,347.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	25,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

By act of—		By act of—	
June 10, 1872	$25,000	July 5, 1884	$28,000
March 3, 1873	25,000	August 5, 1886	26,250
June 23, 1874	20,000	August 11, 1888	35,000
March 3, 1875	20,000	September 19, 1890	45,100
August 10, 1876	10,000	July 13, 1892	45,000
June 18, 1878	10,000	August 18, 1894	15,000
March 3, 1879	2,000	June 3, 1896	15,000
June 14, 1880	32,000	March 3, 1899	15,000
March 3, 1881	50,000		
August 2, 1882	50,000	Total	468,350

Abstract of proposals for dredging in Passaic River, New Jersey, received in response to advertisement dated August 29, and opened September 29, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York City.

No.	Name and address of bidder.	Price per cubic yard.
		Cents.
1	Samuel F. Randolph, New York City	20
2	The W. H. Beard Dredging Co., New York City	19
3	P. Sanford Ross, Incorporated, Jersey City, N. J	17½

Abstract of proposals for rock removal and dredging in Passaic River, New Jersey, received in response to advertisement dated October 30, 1899, and opened at New York City on December 1, 1899, by Col. J. W. Barlow, Corps of Engineers, United States Army.

No.	Name and address of bidder.	Above Greenwood Lake Railway Bridge.			Below same.	Total.
		Removing 5,500 cubic yards gravel.	Removing 150 cubic yards bowlders.	Removing 100 cubic yards ledge rock.	Removing 150 cubic yards material.	
1	James McSpirit & Sons, 122 Wayne street, Jersey City, N. J	$0.87	$5.00	$8.00	$0.87	$6,465.50
2	P. Sanford Ross, Incorporated, 277 Washington street, Jersey City, N.J.	1.00	5.00	10.00	1.00	7,400.00
3	Joseph Oliver Stokes, 80 and 82 Reade street, New York City	.36	16.20	17.83	.27	6,188.50

CONTRACT IN FORCE.

With Joseph Oliver Stokes, of New York City, dated December 11, 1899, for rock removal and dredging, work to commence on or before March 1 and to be completed on or before September 15, 1900. Approved by the Chief of Engineers January 6, 1900.

COMMERCIAL STATISTICS.

Freight handled and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Building materials	409,017	470,368	561,517
Ores and metals	96,167	120,908	173,500
Fertilizers	72,612	72,093	60,100
Coal	113,406	124,746	109,755
Miscellaneous merchandise	818,152	349,967	593,167
To and from Hackensack River	361,370	371,690	464,423
Total	1,370,724	1,509,772	1,962,462

The commerce is largely coastwise and carried in sail and steam vessels, canal boats, and barges drawing from 5 to 14 feet of water.

The number of vessels entered and cleared at the United States custom-house, Newark, N. J., on the Passaic River, during the year 1899 was 162; the tonnage, 30,943 tons.

Of the total commerce on the Passaic River during the year 1899, 56 per cent was carried below Center street, Newark, 37 per cent between the Center street bridge and the Montclair and Greenwood Lake Railroad bridge, and 7 per cent above the latter bridge.

H 9.

IMPROVEMENT OF CHANNEL BETWEEN STATEN ISLAND AND NEW JERSEY.

A description of this waterway and a history of the work done may be found in the Annual Report of the Chief of Engineers for 1897, pages 1130 to 1132.

The work done during the present fiscal year consisted in redredging the channel around the sharp bend at the Corner Stake Light, where the width was increased from 200 to 400 feet for a distance of 1,500 feet, and from 250 to 350 feet for a further distance of 1,500 feet east and west of the 400-foot section, under a contract entered into with the Morris & Cumings Dredging Company, of New York City. The total amount of material removed during the season was 103,663 cubic yards, at a cost of 10$\frac{4}{5}$ cents per cubic yard.

This work restored the channel through Newark Bay to a good navigable condition. It is probable, however, that the cross currents from the north and east will considerably diminish the dimensions obtained.

Money statement.

July 1, 1899, balance unexpended	$32,992.77
June 30, 1900, amount expended during fiscal year	12,449.42
July 1, 1900, balance unexpended	20,543.35
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	10,000.00

APPROPRIATIONS.

By act of—		By act of—	
June 23, 1874	$50,000	September 19, 1890	[1]$22,000
August 14, 1876	10,000	July 13, 1892	[2]20,000
June 18, 1878	15,000	August 18, 1894	[2]10,500
June 14, 1880	29,000	June 3, 1896	[3]13,000
August 2, 1882	40,000	March 3, 1899	32,000
July 5, 1884	10,000		
August 5, 1886	15,000	Total	291,500
August 11, 1888	[1]25,000		

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[1] Includes appropriations made for improving Arthur Kill, New York and New Jersey.

[2] Unexpended balance from appropriation for improving Arthur Kill, New York and New Jersey.

[3] Includes $5,000 for Lemon Creek.

Abstract of proposals for dredging in channel between Staten Island and New Jersey, received in response to advertisement dated August 29 and opened September 29, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York City.

No.	Name and address of bidder.	Price per cubic yard.
		Cents.
1	Samuel F. Randolph, New York City	18
2	The W. H. Beard Dredging Co., New York City	14¼
3	Morris & Cumings Dredging Co., New York City	10¾
4	P. Sanford Ross, Incorporated, Jersey City, N. J	17¾
5	Henry Du Bois Sons Co., New York City	12

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Coal and ores	....	7,404,164	8,349,095
Clay products	....	914,553	1,121,833
Chemicals and fertilizers	....	244,135	237,666
Oils	....	63,043	60,048
Grain	....	877,659	751,124
Machinery and manufactures	....	258,296	263,229
General merchandise	....	422,411	529,496
Total	10,500,832	10,184,261	11,311,991

The above statement is based on individual reports representing 96 per cent of the total tonnage reported.

The commerce for the year 1899 was valued at $165,716,016.

The valuation of ores only was $63,875,000.

The freights are carried in barges, canal boats, and steam and sailing vessels, drawing from 5 to 23 feet of water.

H 10.

IMPROVEMENT OF ELIZABETH RIVER, NEW JERSEY.

A history of this work and a description of the locality are given in the Report of the Chief of Engineers for 1897, pages 1134 and 1135.

No work was done during the present year, no funds being available for that purpose.

When work was last suspended a channel of the desired depth and from 30 to 60 feet wide had been secured from the mouth to Bridge street, Elizabeth. As this channel is not able to maintain itself, it has deteriorated considerably. To maintain the required channel an annual appropriation of $2,500 is considered necessary.

Money statement.

Amount that can be profitably expended in fiscal year ending June 30, 1902, for maintenance of improvement	$2,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—		By act of—	
March 3, 1879	$7,500	July 13, 1892	$5,000
June 14, 1880	7,500	August 18, 1894	3,000
March 3, 1881	4,000	June 3, 1896	3,160
August 2, 1882	8,000		
September 19, 1890	5,000	Total	43,160

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1895.	1896.	1897.
	Tons.	*Tons.*	*Tons.*
Coal	13,300	18,000	14,270
Lumber	....	6,700	3,000
Building material	8,000	8,650	8,750
Miscellaneous	350	2,716	2,845
Total	21,650	36,066	28,865

A statement of the number, character, tonnage, etc., of the vessels employed in this trade could not be procured.

H 11.

IMPROVEMENT OF RARITAN RIVER, NEW JERSEY.

A description of this river and a history of the work done are printed in the Report of the Chief of Engineers for 1897, pages 1136 and 1137.

Operations during the present year consisted in extending the channel to the terminus of the Delaware and Raritan Canal at New Brunswick and in completing Dike C at the Middle Grounds. Work began on December 23, 1899, under a contract entered into December 11, 1899, with James McSpirit & Sons, of Jersey City, N. J., and was completed June 13, 1900.

The dimensions of the channel made during the year were as follows: Width, 100 feet; depth, 10 feet, and length, 450 feet; from which 12,252 cubic yards of broken rock, 613 cubic yards of loose rock, and 3,671 cubic yards of gravel, scow measurement, were removed.

The final estimate of material removed, place measurement, was 8,092 cubic yards of rock, of which 1,745 cubic yards were below grade, and therefore not allowed, making the net amount 6,347 cubic yards. This latter amount was classified as 4,694 cubic yards of solid rock, 239 cubic yards of loose rock, and 1,414 cubic yards of gravel. The price for breaking up and removing solid rock was $2.72 per cubic yard, for removing loose rock $1.09 per cubic yard, and for removing gravel 90 cents per cubic yard.

This work completed the channel from the mouth to the canal outlet at New Brunswick, a distance of 12 miles, the lower 8½ miles having the full width of 200 feet contemplated by the project, and the upper 3½ miles a width of 100 feet.

Of the rock removed from the cut, 10,745 cubic yards, scow measurement, was utilized in completing Dike C at the Middle Grounds, which has been under construction since 1888. Under recent operations 630 feet was added to the dike, making its total length 2,950 feet.

The project for the improvement of this river, adopted June 18, 1878, provided for a channel 200 feet wide and 10 feet deep from the mouth to the canal outlet at New Brunswick, at a total estimated cost of $2,093,662.05 (see Report of Chief of Engineers for 1878, pp. 419 and 420). Since this project was adopted improvements have been made to plant used upon such work and more economical methods have been devised for performing it; a considerable reduction in cost has, therefore, been effected. Basing the cost of the balance of the work upon prices heretofore paid, makes it probable that the total cost will not exceed $1,026,500, instead of the amount given in the estimate of 1878. It is also probable that above Rocky Reach a width of 100 feet will be ample for the needs of navigation for many years to come, so that by limiting the width in that portion of the river to 100 feet, a further reduction in cost of $213,000 would result. The maintenance of a channel 200 feet wide throughout the entire distance would cost $10,000 annually, whereas a channel 200 feet wide to Rocky Reach and 100 feet wide above that point can probably be maintained for $6,000.

Money statement.

July 1, 1899, balance unexpended	$20,000.00
June 30, 1900, amount expended during fiscal year	16,442.32
July 1, 1900, balance unexpended	3,557.68
Amount (estimated) required for completion of existing project	355,250.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	30,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—		By act of—	
June 18, 1878	$200,000	September 19, 1890	$50,000
March 3, 1879	60,000	July 13, 1892	40,000
June 14, 1880	100,000	August 18, 1894	20,000
March 3, 1881	25,000	June 3, 1896	20,000
August 2, 1882	25,000	March 3, 1899	20,000
July 5, 1884	35,000		
August 5, 1886	26,250	Total	671,250
August 11, 1888	50,000		

In addition to the above, $13,963 was appropriated for improving New Brunswick Harbor, New Jersey, in 1836–37.

Abstract of proposals for rock removal in Raritan River, New Jersey, received in response to advertisement dated October 30, 1899, and opened at New York City on December 1, 1899, by Col. J. W. Barlow, Corps of Engineers, United States Army.

No.	Name and address of bidder.	Removing 4,100 cubic yards fixed shale rock (per cubic yard).	Removing 120 cubic yards loose rock (per cubic yard).	Removing 900 cubic yards gravel (per cubic yard).	Total.
1	James McSpirit & Sons, 122 Wayne street, Jersey City, N. J	$2.72	$1.09	$0.90	$12,092.80
2	P. Sanford Ross, Incorporated, 277 Washington street, Jersey City, N. J	4.00	1.50	.50	17,030.00
3	Joseph Oliver Stokes, 80-82 Reade street, New York City	3.96	1.08	.27	16,608.60

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Coal, clay, ores, etc	311,046	350,790	613,464
Manufactures, mainly brick	652,922	658,986	698,998
Lumber	40,428	33,279	49,218
Miscellaneous	214,356	212,917	161,711
Total	1,218,752	1,255,972	1,523,391

The commerce of 1899 was valued at $28,957,303, and was carried in barges, canal boats, steam and sail vessels drawing from 5 to 17 feet of water. The total of all trips reported was 12,595, exclusive of trips by tugs and excursion steamers.

H 12.

IMPROVEMENT OF SOUTH RIVER, NEW JERSEY.

A description of this stream and a history of the work done are printed in the Report of the Chief of Engineers for 1897, pages 1139 and 1140.

The work done during the current year consisted in dredging, under contract entered into with Edgar M. Payn, of Albany, N. Y. The total amount of material removed during the season was 18,024 cubic yards, at a cost of 27¾ cents per cubic yard.

Under the contract, cuts 8 feet deep were made at the following localities:

Two at the mouth of the canal, 75 feet wide, 300 feet long.
At the turn of the canal into Lower South River, 100 feet wide, 200 feet long.
Through the shoal below Pettits, Lower South River, 50 feet wide, 600 feet long.
Through the shoal opposite Pettits, Lower South River, 25 feet wide, 800 feet long.
Through the shoal opposite Edgars, Lower South River, 50 feet wide, 200 feet long.
Through the shoal opposite Dike F, 50 feet wide, 300 feet long.
At the bend opposite Whiteheads, 75 feet wide, 650 feet long.
Through the shoal opposite Willetts, 25 feet wide, 190 feet long.

At the close of operations there was a channel from 7.5 to 8 feet deep and from 50 to 70 feet wide from the mouth through the canal to the Washington wharves below the road bridge.

Money statement.

July 1, 1899, balance unexpended	$5,498.85
June 30, 1900, amount expended during fiscal year	5,498.85

Amount (estimated) required for completion of existing project	83,975.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	20,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—		
March 3, 1871	$15,000	
March 3, 1873	5,000	
		$20,000
June 14, 1880	40,000	
March 3, 1881	6,000	
August 2, 1882	10,000	
August 5, 1886	5,000	
August 11, 1888	5,000	
September 19, 1890	5,000	
July 13, 1892	7,000	
August 18, 1894	5,000	
June 3, 1896	5,000	
March 3, 1899	5,000	
		93,000
Total		113,000

Abstract of proposals for dredging in South River, New Jersey, received in response to advertisement dated July 26, 1899, and opened August 26, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York City.

No.	Name and address of bidder.	Price per cubic yard.
		Cents.
1	Edgar M. Payn, Albany, N. Y	27¾
4	J. S. Packard, Bayonne, N. J	37½
8	International Contracting Co., Syracuse, N. Y	88

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Coal, clay, ore, etc	64,916	60,035	87,400
Manufactures, brick, etc	243,185	209,684	248,212
Miscellaneous	462	4,662	7,590
Total	308,563	274,381	343,202

The commerce of 1899 was carried in barges, canal boats, steam and sail vessels, drawing from 5 feet to 12 feet of water and estimated to have made 3,436 single trips.

H 13.

IMPROVEMENT OF RARITAN BAY, NEW JERSEY.

For a history of this work and a description of the locality see Report of the Chief of Engineers for 1897, pages 1142 and 1143.

The work of the present year consisted in widening, deepening, and extending the Seguine Point and South Amboy channels.

A contract was entered into on September 5, 1899, with the International Contracting Company, of Syracuse, N. Y., to redredge the Seguine Point Channel. Work began October 5 and was completed December 23, 1899, and consisted in the removal of shoals from the channel, which had previously been dredged to a depth of 21 feet and width of 300 feet, the full dimensions of the project, and in restoring the depth along the center and sides of the channel to 21 feet as far as the available funds would permit. The total amount of material removed was 197,398 cubic yards, of which 3,226 cubic yards were not allowed, on account of improper dumping. The price paid for dredging was 9.8 cents per cubic yard.

A contract was also entered into on September 5, 1899, with Thomas Potter, of Jersey City, N. J., for dredging the South Amboy Channel. Work under this contract began on October 12, 1899, and was completed on June 12, 1900.

The narrow channel dredged in 1896–97 across the shoal in Raritan Bay below the mouth of the Raritan River was redredged and widened to practically the full dimensions of the project, namely, a width of 300 feet and depth of 21 feet. The length of the cut made was about 7,000 feet, from which 350,818 cubic yards of material was taken out, of which, however, 2,391 cubic yards were not allowed, on account of improper dumping. The price paid for this work was 12.4 cents per cubic yard.

The available funds would not permit of any excess in width, so as to allow for side slopes. It is therefore probable that a considerable washing in will occur from the sides, thereby reducing the width of the channel.

The original estimate for the improvement of this locality was $507,875. Of this amount $441,000 has been expended, and it is estimated that it will require about $60,000 to complete the work, thus bringing the total expenditure within the original estimate, notwithstanding the fact that the sum of $122,000 was expended in maintenance, thereby showing that the work has been done at a less cost than was originally expected. It is estimated that after the completion of the channels the sum of $20,000 will be required each year for maintenance.

Money statement.

July 1, 1899, balance unexpended	$67,250.00
June 30, 1900, amount expended during fiscal year	66,064.45
July 1, 1900, balance unexpended	1,185.55
Amount (estimated) required for completion of existing project	65,375.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	60,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—		By act of—	
March 3, 1881	$50,000	July 13, 1892	$40,000
August 2, 1882	50,000	August 18, 1894	40,000
July 5, 1884	20,000	June 3, 1896	75,000
August 5, 1886	37,500	March 3, 1899	65,000
August 11, 1888	25,000		
September 19, 1890	40,000	Total	442,500

Abstract of proposals for dredging in Raritan Bay, New Jersey, received in response to advertisement dated July 26, 1899, and opened August 26, 1899, by Col. J. W. Barlow, Corps of Engineers, at New York City.

No.	Name and address of bidder.	South Amboy Channel.	Seguine Point Channel.
		Cents.	*Cents.*
2	Morris & Cumings Dredging Co., New York City	13.4	
3	P. Sanford Ross, Inc., Jersey City, N. J	15	10.5
4	J. S. Packard, Bayonne, N. J		14
5	Wm. H. Taylor, jr., Jersey City, N. J	14.25	22
6	Thomas Potter, Jersey City, N. J	12.4	16
7	John H. Fenner, Jersey City, N. J	13.75	21
8	International Contracting Co., Syracuse, N. Y		9.8
9	Henry S. Beard, New York City	15	12.5

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Coal, ores, etc	3,605,514	4,293,827	4,682,184
Lumber		33,279	51,883
Building material	45,368		1,150,245
Fertilizers	84,521	131,162	162,545
Manufactures	671,795	900,363	65,702
Merchandise	444,877	193,843	394,843
Total	4,852,075	5,552,474	6,507,402

About 4,849,177 tons of the commerce of 1899 passed through the South Amboy Channel, about 2,628,060 tons through the Seguine Point Channel, and about 5,537,567 tons through the Wards Point Channel.

The commerce of 1899 was valued at $51,246,297, and was carried in barges, canal boats, steam and sail vessels, drawing from 5 to 23 feet of water. The total number of trips of vessels passing through the South Amboy Channel was 64,123, including 9,750 trips of tugs.

The total number of vessels entered or cleared at the custom-house at Perth Amboy, N. J., during the year 1899 was 602; total tonnage, 141,299 tons.

H 14.

IMPROVEMENT OF MATAWAN CREEK, NEW JERSEY.

A detailed description of this locality and of the work done are printed in the Report of the Chief of Engineers for 1897, pages 1145 and 1146.

Operations during the present year were carried on under a contract entered into with William H. Taylor, jr., of Jersey City, N. J., and consisted in widening the channel on the north side of the stream between the Matawan Steamboat Company's dock and Maggs's brickyard, a distance of 1,240 feet, by a width of 30 feet. A cut of the same width was also made on the south side of the channel for a distance of 360 feet, around the point opposite Maggs's brickyard. At the mouth of the creek in Keyport Harbor the channel was widened 40 feet on the north side for a distance of 1,000 feet.

The total amount of material removed during the season was 10,400 cubic yards, at a cost of 26 cents per cubic yard.

At the close of operations the channel had a minimum width of 80 feet at the outlet into Keyport Harbor, and a minimum width of 40 feet in the creek as far up as the steamboat dock at Matawan, the depth being 4 feet except for a short distance below the Matawan Steamboat Dock, where it was 3½ feet on the south side of the channel.

Money statement.

July 1, 1899, balance unexpended	$2,965.21
June 30, 1900, amount expended during fiscal year	2,965.21
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	3,000.00

Appropriations.

By act of—		By act of—	
March 3, 1881	$15,000	June 3, 1896	$3,000
August 2, 1882	6,000	March 3, 1899	3,000
September 19, 1890	2,500		
July 13, 1892	9,620	Total	42,120
August 18, 1894	3,000		

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1899.
	Tons.
Farm produce and general merchandise	35,000
Brick	12,000
Fertilizers	4,000
Total	51,000

The commerce of 1899 was carried in barges, canal boats, steam and sail vessels, drawing from 5 to 8 feet of water, and carrying from 50 to 200 tons.

The statement of commerce is approximate only, based on the incomplete returns furnished.

The commercial statistics furnished for previous years were found to have been entirely too high, and have therefore been omitted.

H 15.

IMPROVEMENT OF HARBOR AT KEYPORT, NEW JERSEY.

A description of this locality and a history of the work done are printed in the Report of the Chief of Engineers for 1897, pages 1147–1149.

The work done during the present fiscal year consisted in redredging a portion of the channel between Raritan Bay and the steamboat dock at Keyport. This channel had originally been given a depth of 8 feet and a minimum width of 160 feet, but had shoaled again until there was a least depth of 5 feet and width of 75 feet.

As the funds available were not sufficient to restore the whole channel to a depth of 8 feet, it was deemed best for the interests of navigation to widen the existing channel on the north side to that depth.

The work was done under contract entered into during the previous fiscal year with William H. Taylor, jr., of Jersey City, N. J., and consisted in dredging a cut 30 feet wide, 8 feet deep, and 2,700 feet long, from which 14,500 cubic yards of mud was removed, at a cost of 15½ cents per cubic yard.

At the close of operations the channel from Raritan Bay to the steamboat dock had a depth of from 5 to 8 feet and a width of from 70 to 100 feet.

Money statement.

July 1, 1899, balance unexpended	$2,475.25
June 30, 1900, amount expended during fiscal year	2,475.25
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	5,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—	
August 2, 1882	$30,475
July 13, 1892	5,000
August 18, 1894	5,000
June 3, 1896	2,500
March 3, 1899	2,500
Total	45,475

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1896.	1897.	1899.
	Tons.	*Tons.*	*Tons.*
Farm produce	60,700	63,700	40,000
Fertilizers	8,000	8,000	5,000
Coal and lumber	8,500	8,500	5,800
Fish and shellfish	10,000	10,000	9,600
Miscellaneous	18,000	18,900	7,100
Total	105,200	109,100	67,500

The commerce of 1899 did not differ materially from that of preceding years. The apparent decrease is due to the different sources from which information was obtained.

To the above, the commerce of Matawan Creek should be added, as it passes in and out through Keyport Harbor. During 1899 this commerce amounted to 51,000 tons.

During 1899 the number of passengers carried was 29,825. No new lines of transportation were established.

H 16.

IMPROVEMENT OF SHOAL HARBOR AND COMPTON CREEK, NEW JERSEY.

A description of this locality and a history of the work done are printed in the Report of the Chief of Engineers for 1897, pages 1150 and 1151.

The work done during the present year consisted in dredging a channel 75 feet wide from the 4-foot contour in Raritan Bay through Shoal Harbor to the 4-foot contour in Compton Creek, a distance of 2,600 feet, under a contract entered into during the past fiscal year with the International Contracting Company of Syracuse, N. Y. The total amount of material removed during the season was 16,300 cubic yards.

This work has increased the navigable depth in the channel from 2 to 4 feet, thereby affording better navigation facilities. A gratifying increase in the amount of commerce has been shown as the result of the work done.

Money statement.

July 1, 1899, balance unexpended	$7,912.48
June 30, 1900, amount expended during fiscal year	7,912.48
Amount (estimated) required for completion of existing project	40,130.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	15,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations.

By act of—

September 19, 1890	$5,000
July 13, 1892	3,000
August 18, 1894	3,000
June 3, 1896	5,000
March 3, 1899	8,000
Total	24,000

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Farm produce	70,000	75,000	100,000
Fish and shellfish	75,000	75,000	80,000
Coal	4,000	4,500	4,000
Fertilizers	25,000	30,000	30,000
Miscellaneous	10,000	10,000	12,000
Total	184,000	194,500	226,000

The above freight was carried by 1 steamer, 1 tug, and 225 sailboats, drawing from 2 to 5 feet of water, and whose tonnage vary from 10 to 420 tons.

H 17.

IMPROVEMENT OF SHREWSBURY RIVER, NEW JERSEY.

A description of this locality and a history of the work done are printed in the Report of the Chief of Engineers for 1897, pages 1152–1155.

The work done during the present year consisted partly in dredging the channel between Island Beach and the Sandy Hook Peninsula, under a contract entered into during the previous year with the R. G. Packard Company of New York City. This channel was made 6 feet deep, 100 feet wide, and 1,500 feet long, from which 29,378 cubic yards of material was taken, at a cost of 27½ cents per cubic yard.

The material taken out was pumped directly from the cut to the ocean side of the Government trestle, filling an inlet through the peninsula and making the beach continuous. The current through the inlet had previously been cut off by stone deposited along the trestle by the Quartermaster's Department, United States Army.

During the progress of the work the sand spits on either side of the river wore away rapidly, the material being deposited on an extensive flat between the dredged channel and Island Beach. This flat worked down and spread out until it reduced the width of the cut at the lower end and also the depth of the channel.

A channel, from 40 to 75 feet wide and 300 feet long, was also dredged in the North Branch at Upper Rocky Point, from which 3,000 cubic yards of material was removed, at a cost of 30 cents per cubic yard. This channel has been filled up again by cross currents.

Money statement.

July 1, 1899, balance unexpended	$9,700.15
Amount allotted from river and harbor act approved June 6, 1900	10,000.00
	19,700.15
June 30, 1900, amount expended during fiscal year	9,700.15
July 1, 1900, balance unexpended	10,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	10,000.00

Submitted in compliance with the requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations.

By act of—

August 30, 1852	$1,500	
March 3, 1871	14,000	
March 3, 1873	5,000	
		$20,500
June 18, 1878	18,000	
March 3, 1879	10,000	
June 14, 1880	30,000	
March 3, 1881	86,000	
August 2, 1882	30,000	
August 5, 1886	10,000	
August 11, 1888	10,000	
September 19, 1890	10,000	
July 13, 1892	10,000	
August 18, 1894	5,000	
June 3, 1896	15,000	
March 3, 1899	10,000	
June 6, 1900, allotment	10,000	
		254,000
Total		274,500

COMMERCIAL STATISTICS.

Freight received and shipped by water.

Articles.	1897.	1898.	1899.
	Tons.	*Tons.*	*Tons.*
Farm produce	300,000	350,000	300,000
Fish and shellfish	12,000	13,000	12,000
Coal	25,250	30,000	32,000
Lumber	1,350	1,500	2,000
Building material	8,000	8,500	10,000
Miscellaneous	550,000	600,000	550,000
Total	896,600	1,003,000	906,000

Passengers carried, 400,000.

The commerce given for 1899 was carried in 12 steamers, 6 tugs, 20 sailing vessels, and 2 canal boats, whose draft varied from 3 to 7 feet and tonnage from 200 to 2,500 tons.

H 18.

IMPROVEMENT OF MANASQUAN (SQUAN) RIVER, NEW JERSEY.

A history of this improvement and map of the locality may be found in the Report of the Chief of Engineers for 1898, pages 1070 and 1071.

The work done during the present year consisted only in repairing the north dike. When proposals were opened, July 12, for constructing and repairing the dikes, it was found that the prices were about 25 per cent greater than was expected, and that it would be impossible to construct a sufficient length of the south dike to do any immediate good. It was, therefore, decided to confine operations to the repair of the north dike and to retain the balance of the available funds until another appropriation had been made, the expectation being that the expenditure of a larger amount would enable the work to be done more economically.

The repairs to north dike were completed on November 10, at a cost of $734.71. The following material was used in making these repairs:

7,200 feet B. M. creosoted plank.
550 pounds of bolts and straps.
400 pounds of spikes.

Money statement.

July 1, 1899, balance unexpended	$6,661.80
June 30, 1900, amount expended during fiscal year	736.80
July 1, 1900, balance unexpended	5,925.00
Amount (estimated) required for completion of existing project	13,300.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	13,300.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

By act of—

March 3, 1879	$12,000
June 14, 1880	20,000
August 2, 1882	7,000
September 19, 1890	2,000
March 3, 1899	5,000
Total	46,000

Abstract of proposals for constructing and repairing dikes in Manasquan River, New Jersey, received in response to advertisement dated June 12, 1899, and opened July 12, 1899, at New York City, by Col. J. W. Barlow, Corps of Engineers.

No.	Name and address of bidder.	South dike, constructed of riprap stone, 2,080 tons, per ton.	Total cost.	South dike, constructed of timber.							
				15,540 linear feet creosoted piling, per linear foot.	83,420 feet B. M. creosoted square timber, per 1,000 feet B. M.	100 pounds chain, per pound.	9,200 pounds screw bolts and washers, per pound.	2,300 pounds galvanized spikes, per pound.	200 sand bags, per bag.	4 barrels coal tar, per barrel.	Total cost.
				Cents.		*Cents.*	*Cents.*	*Cents.*	*Cents.*		
1	Richard Parrott, Newburg, N. Y	$3.40	$7,072.00	39	$63.00	10	5	5	25	$6.50	$11,977.20
2	Frank Pidgeon, New York City	4.98	10,358.40	48	72.00	8	7	7	20	10.00	14,358.44
3	Stone & Thurston, New York City	3.35	6,968.00	......	......	......	......	......	......	......	......
4	David V. Howell, New York City	4.28	8,902.40	......	......	......	......	......	......	......	......
5	Samuel F. Randolph, New York City	3.48	7,238.40	......	......	......	......	......	......	......	......

No.	Name and address of bidder.	Repairing north dike.			Total cost.
		9,000 feet B. M. creosoted square timber, per 1,000 feet B. M.	550 pounds tie-rods, bolts, and straps, per pound.	240 pounds galvanized spikes, per pound.	
			Cents.	*Cents.*	
1	Richard Parrott, Newburg, N. Y	$67.00	7	5	$653.50
2	Frank Pidgeon, New York City	85.00	6	7	814.80
3	Stone & Thurston, New York City	112.00	25	10	1,169.50
5	Samuel F. Randolph, New York City	193.33	20	....	1,849.97

COMMERCIAL STATISTICS.

The commerce of this river amounts practically to nothing, owing to obstructions at the inlet. The river is largely used by pleasure craft during the summer season.

H 19.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

1. *Wreck of steamboat W. M. Whitney in Hudson River, New York.*—This wreck consisted of the hull of the steamboat, from which all the machinery and upper works had been removed. It was originally intended to convert the hull into a barge, but before this was done it caught fire and sank at New Baltimore. The wreck was reported June 19 and its removal was authorized June 21, 1899.

This was completed on August 3 at a cost of $90. Nothing of value was recovered from it.

2. *Wreck of steamship Macedonia in Atlantic Ocean off Seabright, N. J.*—The *Macedonia* sank in the Atlantic Ocean about 2 miles off shore from Seabright, N. J. The wreck was reported on June 22 and its removal was authorized July 22, 1899.

Private enterprise has been engaged in removing this wreck. In the event of their failure to do so, proposals for its removal will be advertised for.

3. *Wrecks of canal boats Katie Watson and W. B. Hurd in Newark Bay, New Jersey.*—Notification of these wrecks was received from the board of commissioners of pilotage of New Jersey. The *Katie Watson* had lodged within 30 feet of the channel near Bergen Point Light, and the *W. B. Hurd* on the westerly side of the channel near Shooters Island. The obstructions were reported October 18 and their removal was authorized October 27, 1899.

Proposals for their removal were invited by public notice of October 6, the award being made to the lowest bidder, John F. Baxter, of New York City, at a cost of $360.

The removal of the wrecks was completed November 22. Nothing of value was recovered from them.

4. *Wreck of canal boat R. G. Fairbanks in Hudson River, near Hudson, N. Y.*—This canal boat sprang a leak and sank in Hudson River, near Hudson, N. Y. The obstruction was reported October 25, 1899, with the statement that as a portion of the cargo consisted of explosives, no proposals could be obtained for its removal. Authority was granted on November 3, 1899, to remove the dangerous portion of the cargo by means of a diver, which was done at a cost of $225. The removal of the balance of the wreck was authorized on May 4, 1900.

Proposals for its removal were invited by public notice of March 28, 1900, the award being made to the lowest bidders, Kirk, Driscoll & Co., of Syracuse, N. Y., at a cost of $500.

The removal of the wreck was completed May 29, 1900, at a total cost to the United States of $775. Nothing of value was recovered from it.

5. *Wreck Satanella in Raritan Bay, New Jersey.*—The *Satanella* was used as a coal barge, having been altered from an iron-hulled steam-

boat in 1872 and planked over with wood about thirteen years later. The obstruction was reported February 9 and its removal was authorized February 23, 1900.

Proposals for removing it were invited by public notices of December 26, 1899, and January 17, 1900, but no award was made, as all bids received were considered excessive. Proposals were advertised for on March 3, 1900, the award being made to the lowest bidders, Booye & Townsend, of Atlantic City, N. J., at a cost of $1,765.

The wreck is now being removed under contract.

6. *Wreck of oyster sloop Pacific in Hudson River at New York, N. Y.*—This sloop sprang a leak and sunk in the Hudson River about 100 feet off piers 51 and 52, New York City, occupied by the Cunard Line steamers.

Notice of the wreck was received on April 11, and owing to its being a dangerous obstruction to navigation, immediate possession was taken and the wreck was ordered removed by the Merritt & Chapman Derrick and Wrecking Company. This action was reported on April 12 and was approved on April 16, 1900.

The removal of the wreck was completed on April 13, at a cost of $275. Nothing of value was recovered from it.

7. *Wreck of schooner G. W. Van Cleaf in Keyport Harbor, New Jersey.*—This schooner sank at her anchorage in Keyport Harbor, and after having been stripped by her owners, was abandoned. The obstruction was reported May 5 and its removal authorized on May 10, 1900.

Proposals for removing the wreck were invited by public notice of May 5, 1900, the award being made to the lowest bidder, John F. Baxter, of New York City, at a cost of $249.

The removal of the wreck was completed May 23, 1900. Nothing of value was recovered from it.

Abstract of proposals for removal of wreck Satanella in Raritan Bay, New Jersey, received in response to advertisement dated March 2, 1900, and opened by Col. J. W. Barlow, Corps of Engineers, at New York City on April 2, 1900.

No.	Name and address of bidder.	Price.
1	Merritt & Chapman Derrick and Wrecking Co., 27 William street, New York City	$4,278
2	John F. Baxter, 308 West street, New York City	4,830
3	John H. Gregory, Perth Amboy, N. J	5,800
4	Chas. W. Booye and Enoch Townsend, Atlantic City, N. J	1,765
5	Chas. W. Johnston, Lewes, Del	8,490

CONTRACT IN FORCE.

Contract with Charles W. Booye and Enoch Townsend, of Atlantic City, N. J., dated April 14, 1900, for removing wreck *Satanella* from Raritan Bay, New Jersey, work to commence on or before May 15 and to be completed on or before August 14, 1900. Approved by the Chief of Engineers on May 3, 1900.

H 20.

PRELIMINARY EXAMINATION WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT OF SAUGERTIES HARBOR, NEW YORK.

[Printed in House Doc. No. 107, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, October 10, 1899.

SIR: The river and harbor act of March 3, 1899, provides for an examination and survey of Saugerties Harbor, New York, with a view of extending the improvement from the westerly end of the south dike westerly to the "Point of Rocks;" also with a view to removing the loose rock from the channel and continuing the depth of 12 feet at low water toward the head of the harbor.

The duty of making the examination provided for by the act was assigned to the charge of Col. J. W. Barlow, Corps of Engineers, and I have now the honor to submit the accompanying copy of his report, dated June 24, 1899, which contains a plan with map[1] and estimate of cost of improvement called for.

Work of improving this harbor has been carried on in conformity with a project, adopted in 1884, which provided for securing a channel 300 feet wide and 8 feet deep, by the construction of parallel dikes and dredging between them, such work having been completed in 1892, since which time expenditures have been applied to maintenance.

The cost of extending the improvement westerly to the "Point of Rocks" by means of dike construction and rock excavation is estimated at $7,465, and the annual cost of maintenance after completion at $2,000. For the reason stated in the report the proposed dike construction is to be located above the "Point of Rocks" instead of between the westerly end of the present dike and the "Point of Rocks."

The cost of making a 12-foot channel, 300 feet wide, from the Hudson River to the steamboat landing at Saugerties, to be obtained by extending south dike, rock removal, and dredging, is estimated at $44,685, and the annual cost of maintenance after completion at $2,500.

Colonel Barlow is of opinion, concurred in by me, that this harbor is worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF COL. J. W. BARLOW, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
New York City, June 24, 1899.

GENERAL: I have the honor to submit the following report on a preliminary examination of—

Saugerties Harbor, New York: With a view of extending the improvement from the westerly end of the south dike westerly to the "Point of Rocks," also with a view to removing the loose rock from the channel, and continuing the depth of 12 feet, at low water, toward the head of the harbor.

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[1] Not reprinted. Printed in House Doc. No. 107, Fifty-sixth Congress, first session.

Saugerties Harbor is situated at the mouth of Esopus Creek, which empties into the Hudson River on its west shore, about 100 miles above New York City. The creek is from 180 to 500 feet wide and is navigable for a distance of about 4,000 feet above its mouth. The natural depth in the creek was at least 7 feet, but the entrance was obstructed by a bar on which the depth was only 3 feet.

A project was adopted in 1884 for securing a channel 300 feet wide and 8 feet deep by constructing parallel dikes and dredging between them at a cost of $52,000. Work began in 1887 and was completed in 1892 at a cost of $42,000. Subsequent expenditures were applied to maintenance.

A recent survey indicates that the dikes have been able to maintain a channel of the desired depth, but not of the full width. The dikes themselves are in fair condition, but the superstructure has commenced to decay and will require renewal in a few years.

The first clause in the paragraph providing for a preliminary examination at this locality reads:

> With a view of extending the improvement from the westerly end of the south dike to the "Point of Rocks."

Such an extension of the improvement would undoubtedly be a benefit to navigation interests, as during time of freshets, etc., the current from Esopus Creek impinges on the "Point of Rocks," thereby causing an eddy which results in the formation of a shoal in the channel just below. The cost of extending the improvement westerly to the "Point of Rocks" would be as follows:

Constructing dike west of "Point of Rocks," 475 linear feet, at $10.75	$5,106.25
Excavating 210 cubic yards of rock, at $8	1,680.00
Contingencies, etc., about 10 per cent	678.75
Total	7,465.00
Annual cost of maintenance after completion estimated at	2,000.00

It will be observed that this proposed dike construction is to be located above the "Point of Rocks" instead of between the westerly end of present dike with the "Point of Rocks." The reason for this location is that it will be more effective in maintaining an 8-foot channel below the "Point of Rocks" than if placed lower down, as it will tend to diminish the present cross current, which is objectionable.

The second clause of the paragraph relating to the examination reads:

> Also with a view to removing loose rock from the channel, and continuing the depth of 12 feet, at low water, toward the head of the harbor.

This provision would seem to indicate the intention of Congress to increase the channel depth from 8 to 12 feet and also extend the improvement as far as the steamboat landing at the head of navigation.

The estimated cost of making a 12-foot channel, 300 feet wide, from the Hudson River to the steamboat landing at Saugerties, N. Y., is as follows:

Extending south dike 1,430 linear feet, at $10.75	$15,372.50
Rock removal, 1,250 cubic yards, at $7	8,750.00
Dredging, 66,000 cubic yards, at 25 cents	16,500.00
Contingencies, etc., about 10 per cent	4,062.50
Total	44,685.00
Annual cost of maintenance after completion estimated at	2,500.00

The commerce of Saugerties Harbor, consisting mainly of bluestone, coal, lumber, pulp wood, and general merchandise, amounted to 189,000 tons in 1895, to 120,300 tons in 1896, but only to 51,000 tons in 1897, this large falling off being due to the failure of some paper mills. No statistics have been furnished for 1898, although a request has been made for them. Under ordinary conditions the commerce probably amounts to over 120,000 tons a year. An increase in the channel depth from 8 to 12 feet would probably result in a large increase in the tonnage, as vessels with greater carrying capacity would be able to navigate the harbor. The project for the improvement of the Hudson River contemplates a depth of 12 feet, so that if the same depth was secured for Saugerties Harbor vessels could be loaded to their full capacity and taken to the wharfs at Saugerties.

In my opinion the locality is worthy of improvement by the Government. No further survey is considered necessary.

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

H 21.

EXAMINATION AND SURVEY OF TARRYTOWN HARBOR, NEW YORK.

[Printed in House Doc. No. 283, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 8, 1900.

Sir: I have the honor to submit the accompanying copies of reports dated June 16 and December 15, 1899, with map,[1] by Col. J. W. Barlow, Corps of Engineers, upon preliminary examination and survey, respectively, of Tarrytown Harbor, New York, made to comply with the provisions of the river and harbor act of March 3, 1899.

In the opinion of Colonel Barlow, the locality is worthy of improvement by the United States, and he presents a plan for improvement by dredging a channel along the wharf front and connecting it north and south with deep water in the Hudson River, the said channel to have a depth of 12 feet with a width of 150 feet along the wharf front and a width of 100 feet in the northerly and southerly connections with the Hudson. The estimated cost of this work, including contingencies, is $26,000, and $1,000 or $2,000 biennially for maintenance.

The cost of a 15-foot channel, 150 feet wide throughout, is estimated at $55,000, and $1,000 or $2,000 biennally for maintenance.

Colonel Barlow recommends that, should the project for a 12-foot channel be adopted, the amount of the estimate be appropriated in one sum, in order that the work may be completed speedily and economically.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

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[1] Not reprinted. Printed in House Doc. No. 283, Fifty-sixth Congress, first session.

PRELIMINARY EXAMINATION OF TARRYTOWN HARBOR, NEW YORK.

UNITED STATES ENGINEER OFFICE,
New York City, June 16, 1899.

GENERAL: I have the honor to submit the following report on a preliminary examination of Tarrytown Harbor, New York, made in compliance with section 22 of the river and harbor act of March 3, 1899, and pursuant to Department letter of April 14, 1899.

Tarrytown is situated on the east bank of the Hudson River, about 28 miles from New York City, where the width of the river is several miles. The channel is bordered on both sides by extensive flats, that on the east side measuring about three-eighths of a mile from the main wharf to the 12-foot depth in the river.

An examination of this locality was made in 1888, the report on which may be found in the Report of the Chief of Engineers for 1889, page 800. At that time the harbor was not considered worthy of improvement as the expense probably would be disproportionate to the amount of commerce to be benefited.

The general depth in the harbor is about 4½ feet at mean low water. There are, however, two channels, with a depth of about 6 feet, which lead up to the main wharf. One of the channels extends in a southwesterly direction, and is used by vessels trading with New York, and the other extends in the direction of Nyack, and is used by the ferry line running there. The steamer *Armitage Brearley*, having a draft of 6 feet 10 inches and net tonnage of 189 tons, makes three round trips a week between Tarrytown and New York, and carries during the season from 12,000 to 14,000 tons of merchandise. In addition, a daily line of steamers to Peekskill and a number of canal boats and sailing vessels carry considerable freight.

Tarrytown has now a population of about 10,000 inhabitants, and its commerce consists of coal, building material, general merchandise, and farm products. Considerable property is available for manufacturing purposes, but no concerns will establish themselves there until the depth in the harbor has been increased. The improvement desired consists in dredging a channel from 100 to 150 feet wide and from 10 to 12 feet deep along the wharf front and connecting it north and south with the deep water in the Hudson.

I am of the opinion that Tarrytown Harbor is worthy of improvement by the General Government, provided the work can be done at a cost commensurate with the present and prospective commerce, and respectfully recommend that a survey be made, at a cost of $100, on which to base a project and estimate.

Very respectfully, your obedient servant,

J. W. BARLOW,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Tarrytown Harbor, New York.

The locality is reported to be worthy of improvement, provided the work can be done at a cost commensurate with the commerce involved, and I recommend that a survey be made, after which a more reliable opinion can be formed as to the scope of improvement justified.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF TARRYTOWN HARBOR, NEW YORK.

UNITED STATES ENGINEER OFFICE,
New York City, December 15, 1899.

GENERAL: I have the honor to submit the following report on the survey of Tarrytown Harbor, New York, as provided for in river and harbor act of March 3, 1899, and which was assigned to my charge by Department letter of August 18, 1899.

The report on the preliminary examination of this harbor was submitted June 16, 1899, to which attention is invited.

The present survey was made from November 7 to 9, 1899, by Mr. H. C. Wilson, assistant engineer, whose report is transmitted herewith.

The proposed project for this harbor consists in dredging a channel along the wharf front and connecting it north and south with the deep water in the Hudson.

For the present needs of commerce the channel should be 12 feet deep, with a width of 150 feet along the wharf front and a width of 100 feet in the northerly and southerly connections with the Hudson River channel.

The estimated cost of a 12-foot channel of the above dimensions is as follows:

Dredging 152,222 cubic yards of material, at 16 cents	$24,355.52
Add for engineering expenses, contingencies, etc	1,644.48
Total	26,000.00

To this must be added the cost of maintenance, which is estimated at from $1,000 to $2,000 biennially.

If at any future time the commerce should increase so much that a channel of the above dimensions was insufficient, the width could be increased to 150 feet and the depth to 15 feet throughout. The cost of this additional work would be as follows:

Dredging 168,912 cubic yards of material, at 16 cents	$27,025.92
Add for engineering expenses, contingencies, etc	1,974.08
Total	29,000.00

The estimated cost, therefore, of a 15-foot channel 150 feet wide is $55,000, to which should be added the cost of maintenance, estimated at from $1,000 to $2,000 biennially.

Should the project for a 12-foot channel be adopted, it is recommended that the amount be appropriated in one sum, in order that the work may be completed speedily and economically. The cost of dredging will probably be much higher than estimated if the work is done by piecemeal.

The amount of commerce of Tarrytown Harbor seems quite extensive, and has every prospect of increasing rapidly if the proposed improvement is carried out. A full statement of this commerce is given in the report herewith.

A map of the harbor accompanies this report, on which the proposed channel has been indicated by broken lines.

Very respectfully, your obedient servant,

J. W. BARLOW,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

REPORT OF MR. H. C. WILSON, ASSISTANT ENGINEER.

NEW YORK CITY, *December 13, 1899.*

COLONEL: I have the honor to submit the following report upon a survey of Tarrytown Harbor, New York, made, in accordance with your instructions, from November 7 to 9, the object being to obtain sufficient data from which to prepare a project and estimate of cost of the improvement of the harbor:

Tarrytown is situated on the east bank of the Hudson, about 25 miles above New York City, where it is cut off from the deep water of the river by a submerged flat about three-eighths of a mile in width.

An accurate survey of the village water front having been made under the direction of the village authorities by Mr. Everhard J. Wulff, civil engineer, during the month of June, 1899, it was considered unnecessary to resurvey that portion of the harbor, so the work was confined to carefully sounding the section of the river between the wharfs and the 18-foot contour of the Hudson.

Thirty-three lines of soundings were taken, about normal to the shore, of which every other sounding was located by means of two transits placed at Shinders's and Archibold's docks. These soundings, upon being plotted, showed that the depth along the wharf front varied from 4 to 6 feet, and that there was a very gradual increase in depth from the wharfs to the 9-foot contour of the Hudson, where the depth began to increase more rapidly.

A number of borings were made for the purpose of determining the character of the bottom. This was found to be principally mud, excepting in the vicinity of Husted's dock, where some gravel and hardpan were found.

The river commerce of Tarrytown is principally carried on with New York City. Between these points a steam propeller, the *Armitage Brearley*, makes triweekly trips. This boat draws 7 feet of water and has a gross tonnage of 237.34 and a net tonnage of 189.84 tons. A ferry line is also operated between Tarrytown and Nyack, where it connects with the steamboat *Chrystenah*, of the North River Steamboat Company, which plies between Peekskill and New York. This steamboat is prevented from landing at Tarrytown by the shoal condition of the harbor.

Most of the commerce by water is carried by canal boats and small sailing vessels, and consists principally of coal, building material, and general merchandise.

The following statement of the amount of commerce brought to and taken from Tarrytown by water during the past year was procured from the owners of the different docks, and is believed to be reasonably accurate:

Coal	tons	20,000
Lumber	M feet B. M.	1,330
Laths	bundles	11,000
Shingles	do	2,000
Cement, lime, and plaster	tons	775
Bluestone	do	500
Paving stone	do	200
Gravel	cubic yards	3,000
Wood	cords	200
General merchandise	tons	20,000

The ferry company reports that 15,000 passengers were carried each way between Tarrytown and Nyack.

One of the principal industries of Tarrytown is the Rand Drill Works. This company reports that about 2,500 tons of machinery and supplies are received annually, and that their shipments amount to about the same number of tons. This freight is, however, handled by railroad, owing to the insufficient depth of water in the harbor. An automobile factory has lately been established at Kingslands Point, where it is expected a large business will be carried on.

In the event of the improvement of Tarrytown Harbor, private enterprise proposes to build a causeway between the Rand Drill Works and Kingslands Point, and then have the shoal body of water behind it filled in, leaving a proper outlet for Pocantico River.

I was informed that inducements were being offered to shipbuilders and manufacturers to locate at Tarrytown should the improvement of the harbor be undertaken by the Government.

The problem at Tarrytown is very similar to that at Peekskill, where a channel was dredged along the wharf front and then connected north and south with the deep water of the Hudson. This plan having proved so successful there, a like one is proposed for Tarrytown. Before, however, determining the width and depth of the proposed channel, inquiry was made as to the dimensions that would probably be required by commerce. As a result of this inquiry, it was ascertained that the channel, to be of any practical use, should be at least 100 feet wide and 11 feet deep at low water.

The channel as laid down on the accompanying map is the one which is respectfully recommended for adoption. It has a width of 150 feet between Husted's and Shinders's docks, and is connected north and south with the Hudson by channels 100 feet wide, the depth throughout to be 12 feet at mean low water.

The following is an estimate of the cost of securing such a channel:

Dredging 152,222 cubic yards of material, at 16 cents	$24,355.52
Add for engineering expenses, contingencies, etc	1,644.48
Total	26,000.00

Should the amount of commerce at any future time warrant it, the channel could be made a uniform width of 150 feet, with a depth of 15 feet at mean low water. The estimated cost of this channel is as follows:

Dredging 321,134 cubic yards of material, at 16 cents	$51,381.44
Add for engineering expenses, contingencies, etc	3,618.56
Total	55,000.00

Should the proposed improvement be made, a large saving in freight would be effected, owing to the increased size of vessels that could land at the docks. The North River Steamboat Company have also stated that, if the amount of traffic warranted it, the *Chrystenah* would land regularly at Tarrytown, thereby doing away with the necessity of ferrying passengers to and from Nyack.

Very respectfully,

H. C. Wilson, *Assistant Engineer.*

Col. J. W. Barlow,
Corps of Engineers.

H 22.

EXAMINATION AND SURVEY OF ARTHUR KILL, OR STATEN ISLAND SOUND, NEW YORK AND NEW JERSEY.

[Printed in House Doc. No. 393, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, February 2, 1900.

Sir: I have the honor to submit the accompanying copies of reports, dated May 2, 1899, and January 25, 1900, with map[1] in three sheets, by Col. J. W. Barlow, Corps of Engineers, giving the results of preliminary examination and survey, respectively, of Arthur Kill, or Staten Island Sound, New York and New Jersey, from Kill van Kull to Raritan Bay, made under the provisions of the river and harbor act of March 3, 1899, with a view to obtaining a 21-foot channel, by way of Staten Island Sound, from New York Bay to Raritan Bay.

This waterway has been under improvement by the General Government since 1874, the present project providing for the securing of a channel 400 feet wide and 14 feet deep at mean low water.

The project now presented contemplates securing, by dredging and diking, a channel 21 feet deep from Kill van Kull to Raritan Bay, with a width of 300 feet, except at the sharpest turns, where the width is increased to 400 feet. The work proposed is estimated to cost $696,000, and $5,000 additional annually for maintenance.

In the opinion of Colonel Barlow the cost of the proposed improvement is reasonable when compared with the benefits to accrue and their lasting character, and he is further of opinion that the project is one worthy of being undertaken by the United States.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF ARTHUR KILL, OR STATEN ISLAND SOUND, NEW YORK AND NEW JERSEY, FROM KILL VAN KULL TO RARITAN BAY, WITH A VIEW TO OBTAINING A 21-FOOT CHANNEL, BY WAY OF STATEN ISLAND SOUND, FROM NEW YORK BAY TO RARITAN BAY.

United States Engineer Office,
New York City, May 2, 1899.

General: I have the honor to submit the following report of a preliminary examination of "Arthur Kill, or Staten Island Sound, from Kill van Kull to Raritan Bay, with a view to obtaining a 21-foot channel, by way of Staten Island Sound, from New York Bay to Raritan Bay," made in compliance with section 22 of the river and harbor act of March 3, 1899, and pursuant to Department letter of April 14, 1899.

This waterway forms part of an important and much used line of communication between New York Harbor and Raritan Bay. It is also a link in the chain of inland navigation between the Passaic and Hackensack rivers through Newark Bay on the north and the Raritan River, the Delaware and Raritan Canal to Philadelphia on the south. It has been long recognized by Congress as worthy of improvement by the General Government, an aggregate of $232,970.31 having been expended upon its improvement.

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[1] Not reprinted. Printed in House Doc. No. 393, Fifty-sixth Congress, first sessior

The present commerce, which is said to be increasing, amounts annually to 9,000,000 tons, consisting of oil, coal, and miscellaneous freights received from various railways; brick, clay, and fertilizers from the country adjacent to the several water courses which are its natural tributaries.

The original depth at mean low water was 15 feet and upward, except at its northern end, where it joins Newark Bay. Here a shoal, having a channel with but 9½ feet depth through a tortuous channel, existed. This part of the channel has been repeatedly dredged to 14 feet, but owing to the peculiar effect of the tides, which flow in from both directions and sweep over the broad shoal area of Newark Bay to the north and west, the excavated channel soon becomes again obstructed. Several projects looking to dike protection have been considered, but with the exception of the construction of one dike on the south of the dredged channel 2,237 feet long, none of these projects have been carried out.

Navigation interests now desire that a depth of 21 feet and sufficient width for navigation be provided through the entire length of this waterway. This length is about 15 miles, of which there is now a depth of 21 feet or more for a distance of about 9 miles. The remaining distance of 6 miles will require dredging, the depth of cutting being from 0 to 7 feet. An additional dike will probably be required north of the proposed excavation at Newark Bay, and another to contract the channel at Story Flats. A low cut-off dike might be advisable behind Pralls Island.

The project as outlined is considered worthy, and to ascertain the amount and location of the dredging and dikes required a survey is recommended, at an estimated cost of $1,500. As no complete survey of this water course has ever been made, it is desirable that the present one be carried out in considerable detail.

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Arthur Kill, or Staten Island Sound, from Kill van Kull to Raritan Bay (full text of item quoted within), New York and New Jersey.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.
By order of the Secretary of War:

John C. Scofield,
Chief Clerk.

SURVEY OF ARTHUR KILL, OR STATEN ISLAND SOUND, NEW YORK AND NEW JERSEY, FROM KILL VAN KULL TO RARITAN BAY, WITH A VIEW TO OBTAINING A 21-FOOT CHANNEL, BY WAY OF STATEN ISLAND SOUND, FROM NEW YORK BAY TO RARITAN BAY.

United States Engineer Office,
New York City, January 25, 1900.

General: I have the honor to submit the following report of a survey and estimate of cost of improving "Arthur Kill, or Staten Island Sound, from Kill van Kull to Raritan Bay, with a view to obtaining a 21-foot channel, by way of Staten Island Sound, from New York Bay to Raritan Bay," made in compliance with section 22 of the river and harbor act of March 3, 1899, and pursuant to Department letter of August 11, 1899, together with a map of the survey in three sheets.

The report on the preliminary examination of this locality was submitted on May 2, 1899, to which attention is invited.

The survey was made between September 5 and October 24 by Mr. C. S. Kelsey, assistant engineer, whose report is transmitted herewith.

The project proposed for this improvement consists in securing a 21-foot channel, 300 feet wide (except at the sharpest of the turns, where it has been increased to 400 feet), from Kill van Kull to Raritan Bay. The limits of the proposed channel are shown on the maps of the survey.

This project provides a channel equal in dimensions to that now being made, and nearly attained, through Raritan Bay, which connects the southern entrance of the Arthur Kill with Lower New York Bay. The channel through Kill van Kull, which connects the northern entrance of the Arthur Kill with Upper New York Bay, has a channel depth nowhere less than 25 feet.

In addition to excavating the channel, it is proposed to construct a dike at Shooters Island so as to direct a part of the ebb from Newark Bay into the entrance of the Arthur Kill, and to cut off the cross tides over the dredged channel. This dike will be of great benefit to that section of Elizabethport directly below the railroad bridge over Newark Bay. A second dike is proposed at Story Flats, near Seawaren, to contract the cross section of the waterway, in case this is found necessary to maintain the channel depth. An estimate of cost is given at the close of this report.

The survey has afforded the following information in relation to the merits of the project. The greatest obstruction to navigation in the Arthur Kill lies directly at its entrance from the north and east. Upon the opening of the proposed channel through this entrance there would be immediately available a depth of not less than 18 feet along the entire water front of Elizabethport and Bayway, with a dock frontage, improved at the present time for a length of 13,000 feet, and occupied by coal-shipping terminals, shipyards, and great manufacturing industries.

Communication with the Arthur Kill from the south is obstructed at Story Flats, 1.5 miles from the southern entrance. If the proposed depth of 21 feet be secured across this shoal, the increased depth will be available without further improvement for an additional distance of 2 miles of deep-water frontage, as far as the Fresh Kills, now partially occupied by coal-shipping terminals and extensive manufactories.

Between the Fresh Kills and Pralls Island there are a number of shoals, separated by pools of deep water. The removal of each shoal, as the work progresses, will make the full depth of the project available along the property fronting the next pool above. The attainment of the entire project would be equivalent to adding 20 miles of deep-water frontage to the waters of New York Harbor, lying half within the State of New Jersey and half within the State of New York and city of greater New York. It would give the central portion of the Arthur Kill, now comparatively cheap property, the facilities of New York Harbor water-front property, and must stimulate the growth of the present great industries and attract other works, with a corresponding increase to the taxable values of the States and municipalities in which they lie.

An additional reason for improving this important waterway is that it will afford a protected inland route from Perth Amboy and South Amboy to Upper New York Bay, thereby providing uninterrupted communication during stormy weather when the navigation of Raritan Bay and Lower New York Bay is extremely hazardous.

Under the present project, which is for a 14-foot channel, foreign commerce is excluded from the northerly 10 miles of the Arthur Kill. The coastwise traffic is excluded to an extent increasing with the present tendency to build vessels and barges of greater size and draft. A depth of 21 feet at mean low water, or about 26 feet at mean high water, would admit all but the largest of vessels.

It is believed that the proposed improvement is of a permanent nature and will require only a small expenditure for maintenance, as there are no considerable silt-bearing tributaries, the shoals are not sedimentary deposits, and there are no shifting sand bars. These favorable conditions do not prevail at any of the improvements proposed or adopted in this district or probably in this vicinity.

The cost of the improvement, in comparison with the benefits to accrue and their lasting character, is reasonable, and the opinion expressed in the report upon the preliminary examination, that the project was a worthy one, is adhered to after this more detailed investigation.

Estimate of cost.

To provide a channel from the Kill van Kull to Raritan Bay, 300 feet wide and 21 feet deep at mean low water:

Dredging, 3,766,150 cubic yards, at an average rate of about 14 cents	$523,243
Rock removal, 24,000 cubic yards, at $2	48,000
Diking, 8,200 linear feet	55,200
Engineering and contingencies, about 10 per cent	69,557
Total	696,000
Annual cost of maintenance	5,000

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

REPORT OF MR. C. S. KELSEY, ASSISTANT ENGINEER.

New York, N. Y., *January 24, 1900.*

Colonel: I have the honor to submit the following report upon a survey of the Arthur Kill, New York and New Jersey, made in compliance with your verbal orders of August 21, 1899:

A survey party was organized, sounding boat and steam launch hired, and the field work of the survey commenced September 5. An exact system of triangulation, comprising about sixty stations, was established to cover the area under survey. Half of the primary stations were referenced. The field party was provided with sketches of stations used on the United States Coast and Geodetic Survey and on the survey of the New York Harbor Line Board. Points that were identified were connected with this survey. Prominent natural objects on each shore were located. Light, portable platforms were designed and employed for elevating the instrument and observer at stations on the marsh, reducing the number of observation stations required. Base lines were measured at the northern limit of the survey and midway; at the southern limit connection was made with known points of earlier surveys. Docks and important shore line were located.

The plane of mean low water had been determined by the United States engineers, both at the northern and southern entrance to the kills. It is substantially the same plane and was transferred to three intermediate gauges by simultaneous tidal observations, averaging the slopes of slack current occurring after both high and low water stand. The bed of the waterway was developed by over 5,000 soundings, taken mainly in cross sections. Borings were made to determine the character of the material to be excavated. The boring arrangement was designed so as to enable samples to be taken at the various penetrations obtained. It was operated by the survey party from the steam launch, using the pump of the launch to drive the jet pipe. The office work of platting and mapping, the study of a project, and the calculation of quantities and estimates has been prosecuted as rapidly as the other duties of the office force would permit.

The map which is submitted with this report shows the line of the proposed channel from the Kill van Kull to Raritan Bay, 21 feet deep and 300 feet wide, increased to 400 feet around two sharp turns. A marked deviation from the present channel line was made between Shooters Island and Elizabethport. It is proposed to abandon the present channel at this locality, which has been under improvement by the United States, and take a more direct course south of the Corner Stake Light. The change of the direction in the present channel of about 90 degrees within a distance of 1,000 feet is not feasible for a ship channel, and the position is most unfavorable for maintenance. The proposed line is more favorably located with reference to the underlying ledge rock and the course drift in the vicinity of the Corner Stake Light. It has advantages over a line running north of Shooters Island, both in amount of excavation, character of the material, facility to navigation, and ease of maintenance.

The length of the channel that will require dredging for the full width of 300 feet is about 6 miles. Dredging for partial widths will be required for an additional distance of 3 miles. The total amount of excavation is estimated at 3,790,150 cubic yards, based on allowance for side slopes, three horizontal to one vertical, for overdepth o

1 foot in dredging, and 25 per cent increase for scow measurement. In the estimate of cost the unit rates assumed were determined with due reference to class of material, depth of cutting, amount and location of the work. A dike is provided west of Shooters Island to protect the channel from the cross tides on the Newark Bay Flats. A dike is provided also to contract the cross section at Seawaren. The latter may not prove a necessity, as the deep pool through the middle of the reach is an indication that the shoals above and below the pool are not due to deposits caused by the enlarged cross section, but are a compact formation that have resisted erosion.

The estimate is based on the present system of towing dredged material to the public dumping grounds at sea. Should the Sandy Hook Light-Ship be designated as the public dumping ground, as now proposed by the supervisor, it would probably result in the use of a large amount of the excavated material from the Arthur Kill in reclaiming marsh land along the shores. The estimate is believed to be ample to cover the cost of the work under these conditions. Shale rock and heavy material may be utilized in filling the dike at Shooters Island and in constructing the dike at Seawaren.

Estimate for a channel through the Arthur Kill, from Kill van Kull to Raritan Bay, 21 feet deep at mean low water and 300 feet wide.

Dredging:	
445,000 cubic yards, at 8 cents	$35,600
1,333,350 cubic yards, at 12 cents	160,002
1,508,150 cubic yards, at 16 cents	241,304
479,650 cubic yards, at 18 cents	86,337
Rock removal, 24,000 cubic yards, at $2	48,000
Diking, 8,200 linear feet	55,200
Total	626,443
Engineering and contingencies, about 10 per cent	69,557
Total	696,000
Annual cost of maintenance is estimated at	5,000

The physical characteristics are most favorable for maintenance, except across the Newark Bay Flats. Through the Arthur Kill proper both the ebb and flood currents are strong. The shoals are not sedimentary deposits, but glacial drift formations that have resisted erosion, while the lighter material has been scouring away and the deep pools forming between the shoals. There are no silt-bearing streams of any magnitude emptying into the kills and no shifting sand bars. The dike proposed at Shooters Island is expected to reduce the shoaling in the channel from Shooters Island to Elizabethport to a small amount.

Respectfully submitted.

C. S. Kelsey, *Assistant Engineer.*

Col. J. W. Barlow,
Corps of Engineers.

H 23.

EXAMINATION AND SURVEY OF PASSAIC RIVER, NEW JERSEY.

[Printed in House Doc. No. 401, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, February 6, 1900.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of Passaic River, New Jersey—

With the view of ascertaining the cost and feasibility of extending a 10-foot channel of suitable width from Center Street Bridge to the Montclair Railway Bridge, and also as to the feasibility and cost of affording a channel 12 feet in depth from Center Street Bridge to Staten Island Sound; also an examination of said river from Montclair Railway Bridge to the city of Paterson—

and I now have the honor to submit herewith copies of reports submitted by Col. J. W. Barlow, Corps of Engineers, May 5, 1899, and

November 13, 1899, upon preliminary examination, and December 30, 1899, and January 31, 1900, giving the results of surveys of the Passaic River from its mouth to the city of Paterson.

The Passaic River is at present under improvement by the United States under a project which provides for securing a depth of 10 feet at mean low water up to Center Street Bridge, Newark, and a depth of from 6 to 7½ feet from Newark to Passaic; and the object of the above-quoted item of the act of March 3, 1899, is to ascertain the feasibility and cost of increasing the available depths in the lower reaches of the stream, and the opening of the river for navigation purposes from the present head of navigation to Paterson.

Although Center Street Bridge, Newark, the limit for a 10-foot channel under the present project, is named as the upper limit of the proposed 12-foot channel, and an extension of the 10-foot channel is proposed to the Montclair and Greenwood Lake Railroad Bridge, estimates for both of which channels are duly submitted in accordance with the requirements of the act, Colonel Barlow states in his report of December 30, 1899, that the requirements of traffic and the physical characteristics of the stream make it preferable to continue the project for a depth of 12 feet to a point about 8,000 feet above the Center Street Bridge. From this point to the Montclair and Greenwood Lake Railroad Bridge a depth of 8 feet is said to be ample for the commercial interests involved.

While there are no engineering difficulties connected with the proposition to extend the improvement of the river from the railway bridge up to Paterson, the question is somewhat complicated by the existence of a franchise granted by the State of New Jersey to the Dundee Water Power and Land Company, under the authority of which the company has constructed a dam for water-power purposes about 3 miles below Paterson. This company also has authority to provide for navigation above and below the dam by the construction of the necessary canals, locks, and appurtenances, with the privilege of collecting tolls for passengers and freight. A canal and locks were partially constructed, but the project has probably been definitely abandoned, as the company now expresses a willingness to afford all reasonable facilities for carrying out the proposed project for improvement by the General Government. The company has made verbal promises to grant free right of way over its lands, to permit the free entry into the pool above the dam, to restrict the use of water by mill owners so that the pool shall never be drawn down below a level 1 foot below the present crest of the dam, and also that the dam shall be maintained by the company without expense to the United States; but, as recommended by the local officer, these concessions should be guaranteed in proper legal form before the work of improvement is actually begun.

Colonel Barlow also states that the board of chosen freeholders of Passaic County have promised that the expense of changing all bridges so as to admit of navigation through them shall be borne by the county, and no expense in that connection will have to be incurred by the United States.

These difficulties being removed, there seems to be no question as to the feasibility of extending navigation up to Paterson. The plan proposed provides for securing a depth of 8 feet at low water by dredging the river channel as far as practicable, and then by a lateral canal and locks to connect with the pool above the water-power company's dam.

Attention is invited to Colonel Barlow's reports for all details in regard to the proposed improvements and the various estimates submitted. The following is a summary of the work recommended by him:

For a channel 200 feet wide and 12 feet deep at mean low water from deep water in Newark Bay to the Nairm Linoleum Works, about 8,000 feet above the Center Street Bridge in Newark....	$230,000	
For a channel 8 feet deep at low water from the Nairm Linoleum Works to the Montclair and Greenwood Lake Railroad Bridge.	43,000	
		$273,000
For a channel 8 feet deep at low water via canal on east bank of river:		
From the Montclair and Greenwood Lake Railroad Bridge to the head of navigation..................................	203,258	
From the head of navigation to the Dundee Dam	657,305	
		860,563
Total..		1,133,563

An estimate of $5,000 is submitted as the amount that will be required annually for maintenance of the completed improvement between the mouth of the river and the Montclair and Greenwood Lake Railroad Bridge.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF PASSAIC RIVER, NEW JERSEY, WITH A VIEW OF OBTAINING A CHANNEL 10 FEET DEEP FROM CENTER STREET BRIDGE, NEWARK, TO MONTCLAIR RAILWAY BRIDGE, AND 12 FEET DEEP FROM CENTER STREET BRIDGE, NEWARK, TO STATEN ISLAND SOUND, AND EXAMINATION OF SAID RIVER FROM MONTCLAIR RAILWAY BRIDGE TO PATERSON.

United States Engineer Office,
New York City, May 5, 1899.

General: I have the honor to submit the following report of a preliminary examination of the Passaic River, New Jersey:

> With the view of ascertaining the cost and feasibility of extending a ten-foot channel of suitable width from Center Street Bridge to the Montclair Railway Bridge, and also as to the feasibility and cost of affording a channel twelve feet in depth from Center Street Bridge to Staten Island Sound. Also an examination of said river from Montclair Railway Bridge to the city of Paterson.

This stream is an important waterway, a part of the route connecting the manufacturing cities of Newark and Passaic through Newark Bay and the Kill van Kull with New York Harbor, and through the Arthur Kill with Raritan Bay and the Raritan River. Its drainage area comprises a large section of northeastern New Jersey and a portion of the State of New York. The river was originally navigable to Passaic, a distance of 16 miles, the depth then being, as far as Newark, about 7 feet, and from Newark to Passaic about 3 feet. The rise of the tide at the mouth is 4.7 feet, at Passaic 2.5 feet.

Improvements by the United States Government have increased the depth at mean low water to 10 feet as far as Center street, Newark, and to 6 feet between Newark and Passaic, the width obtained being from 50 to 200 feet.

The estimated cost of improving this river under the present project, authorized by Congress in 1892, was $547,697. Of this sum there had been expended to June 30, 1898, $453,312.19. In addition to dredging, the work consisted in the construction of several small dikes in the upper river and 6,205 linear feet of dike at the head of Newark Bay. It is understood that some shoaling has occurred since work ceased.

The navigation interests now desire an increase in depth to 12 feet from Newark Bay to Center Street Bridge, Newark, and to 10 feet with suitable width from Center Street Bridge to the Montclair Railway Bridge. An examination is also desired from the Montclair Railway Bridge to the city of Paterson.

The city of Newark, with a population of 230,000, includes within its limits the Passaic River from Newark Bay to the Montclair Railway Bridge, a distance by water of about 7 miles. There are numerous large manufacturing establishments along this part of the river, from which are sent out machinery and other iron and steel products, chemicals, minerals, and fertilizers. Large quantities of building material, such as brick, stone, lime, etc., also coal, lumber, and miscellaneous articles, are received. The total tonnage by water for 1897 was 1,370,724 tons.

The general tendency of commerce now being to employ deeper-draft vessels, the interests involved in the navigation of this river would seem to justify an increase in the depth of channel to 12 feet at mean low water through the city of Newark as far as the principal industries have been located. Manufacturing establishments with suitable docks now extend to Center street and considerably above; the 12 feet depth might therefore properly extend to Middle Bar, about 9,000 feet farther up the river. Above this point the present necessities do not seem to require any greater depth than is needed for communication with Passaic, which is understood to be 6 feet at mean low water, a depth provided by the present project.

Passaic is the head of navigation. The character of the river changes immediately above this point, its current originally being rapid and obstructed by numerous rocky shoals. Navigation is now entirely cut off by the Dundee Water Power and Land Company's Dam, chartered by the State of New Jersey in 1828 and built in 1860.

The question of extending navigation to Paterson came up in 1882 and was favorably reported upon by Major (now Colonel) George L. Gillespie, Corps of Engineers. The river from Passaic to Paterson was then considered "worthy of improvement, and the work a public necessity." A survey and map of this part of the river was made under Colonel Gillespie's direction in 1884, a report of which, together with that of the preliminary examination, will be found in the Report of the Chief of Engineers for 1884, pages 780–784.

From these reports it appears that the Passaic River above the mouth of Weasel Brook (within the present limits of Passaic) was placed in 1828 by the State of New Jersey under the control of the Dundee Water Power and Land Company, with the object of furnishing power for grist mills and other manufacturing establishments; and that in 1858 this company was authorized to provide for navigation between Passaic and Paterson, with the right to "construct, erect and execute one or more canal or canals, dam or dams, with the necessary locks and appurtenances, and is empowered on payment of proper compensation to take possession of or overflow all such lands as may be necessary to the proper execution of the plans of improvement."

The act provides that these canals, the river and works, shall be—

> a public highway free for the transportation of passengers and freight, on payment of the established tolls, and that the company may use the waters thereof at their mills and works for manufacturing purposes, provided that the navigation of the canal or canals, or the river, shall not be thereby in anywise hindered or obstructed.

Under this authority, the company, besides building a dam, constructed a canal about 1½ miles long, having a substantial stone lock at its head, and two partially constructed locks near the foot to connect the canal through Weasel Brook with the river. No vestige of the latter now remains. The chamber of the upper lock is 100 feet by 24 feet; its walls are still in good condition, and gates only are required to make the lock useful for navigation.

The construction of the dam has provided a pool about 3 miles in length with sufficient depth for navigation, extending to above Broadway in the city of Paterson. Should the canal be provided with suitable locks and connected with the river below, either by way of Weasel Brook, as originally intended, or directly at the extreme southern end where it nearly joins the river, navigation would be at once extended to the lower part of the city of Paterson, a distance of about 5 miles. It is possible that the object desired would be thus attained.

To carry the improvement further would require extensive works, including one or more locks with movable dams, and probably a considerable channel excavation in rock. The present canal and the pool above is obstructed by several fixed bridges, which would have to be modified to permit navigation through them; and should the Weasel Brook route below the canal be adopted, a fine stone arch bridge crossing this stream would have to be removed.

Another possible method of improvement would be to deepen the river above the present head of navigatien as far as possible and construct an independent system of slack water, to connect with the pool of the Dundee Water Power Company. This method would be very costly, and to carry it out would require the sanction of the Dundee Company.

In view of all the conditions which I have been able to ascertain from a personal examination of this waterway and the published reports upon the subject, I am of the opinion that Newark Bay and the Passaic River from its mouth through the city of Newark to the Montclair Bridge, is worthy of further improvement, and a survey to obtain additional data required to estimate the cost of extending a 10-foot channel of suitable width from Center Street Bridge to the Montclair Railway Bridge, and a 12-foot channel from Center Street Bridge to Staten Island Sound, is recommended. This survey can be made for $300.

In regard to the question of extending navigation to the city of Paterson, I am of the opinion that although there does not appear to be any very pressing demand on the part of the business interests of Paterson for this improvement, yet should the present canal and pool be opened to navigation, as seems to have been the design when the rights of the Dundee Water Power Company were acquired, I am of the opinion that such navigation would be of great value to

Paterson, as facilities would thereby be afforded for the receipt and shipment of heavy freights, which now are carried by rail at greater cost.

Up to the present time, Paterson has never had water transportation, consequently a class of manufactures, chiefly silk fabrics, has grown up, of a character which has depended solely on railroads for transportation. These interests would probably continue to use rail transportation, even were the river opened to navigation, but the cost to the citizens of many articles such as coal and building materials, including stone, brick, lumber, etc., would be materially reduced by the extension of river navigation to the city. It is also probable that manufacturing interests of a different nature from those now established, and which require cheap transportation, would soon be developed.

As the survey made in 1884 shows all the conditions as they now exist of the river from the mouth of Weasel Brook to the falls of the Passaic, no further survey at present is deemed necessary, and until the Dundee Company voluntarily or otherwise shall open this canal as a public highway free for the transportation of passengers and freight, as required by the act of 1858, it would seem to be impracticable for the United States to take any action looking to the improvement of this section of the Passaic River.

My conclusion is, therefore, with respect to the river above the city of Passaic, that the project for its improvement is worthy, provided the obligations of the Dundee Water Power and Land Company are first carried out, with respect to the requirements which provide for a navigable canal from the present head of navigation to the pool above the dam.

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Passaic River, New Jersey (full text of item quoted within).

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated, as proposed by Colonel Barlow.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

John C. Scofield,
Chief Clerk.

[Third indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
November 18, 1899.

Respectfully returned to the Secretary of War.

Previous action in this case will be seen by reference to first and second indorsements hereon.

In view of additional information furnished Colonel Barlow since the date of this report, a supplemental report dated the 13th instant, herewith, is now submitted, and, concurring in the views therein, I recommend that the survey of the Passaic River, heretofore authorized, be extended to include the river between Passaic and Paterson, N. J., with a view to determining the feasibility and cost of obtaining a navigable depth of 8 feet at low water by means of locks and dams.

JOHN M. WILSON,
Brig. Gen. Chief of Engineers,
U. S. Army.

[Fourth indorsement.]

WAR DEPARTMENT,
November 22, 1899.

Approved as recommended in the third indorsement.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SUPPLEMENTARY REPORT UPON PRELIMINARY EXAMINATION OF PASSAIC RIVER, NEW JERSEY, WITH A VIEW TO ITS IMPROVEMENT FROM MONTCLAIR RAILWAY BRIDGE TO PATERSON.

UNITED STATES ENGINEER OFFICE,
New York City, November 13, 1899.

GENERAL: I have the honor to present herewith the inclosed communication from the Paterson Board of Trade, with accompanying papers, upon the subject of extending the navigation of the Passaic River to include a portion of the city water front of Paterson, N. J.

A preliminary report on this subject was made by me on May 5, 1899, in which I stated that the cost to the citizens of many articles would be reduced and that manufacturing interests requiring cheap transportation would be developed by this improvement. I also stated that, in my opinion, the river above the city of Passaic was worthy of improvement, provided the obligations of the Dundee Water Power and Land Company were carried out, which were to provide a navigable channel from the present head of navigation to the pool above their dam.

In my investigation for that report I freely consulted the same people who have prepared the inclosed communication, but at that time they either did not appreciate the necessities of the situation and the demands of their city, or from some cause omitted to give me the benefit of their knowledge.

My report was made upon the understanding that canal navigation between Passaic and Paterson, such as the Dundee Water Power and Land Company was required to provide, would be satisfactory, but it now appears from the wishes and demands of the business interests of Paterson, as set forth in the accompanying letter from the Paterson Board of Trade, that such navigation would not be adequate or desirable.

The route suggested in this letter is the one alluded to by me as an independent system of slack water, by which the pool above the dam could be reached by following the channel of the river and avoiding the canal and locks of the Dundee Company.

This route would be expensive, as it will involve the construction of a lock and dam at a suitable point below the Dundee Dam, and a lock in connection with the latter. There are probably no special engineering difficulties to be encountered, and the question of foundations can easily be determined by a survey.

To obtain a depth of 8 feet above the dam along the river front a distance of 2½ miles would require a moderate amount of excavation, but to provide even a 6-foot depth 1¼ miles farther up would necessitate such a large amount of rock removal that it might be deemed expedient to put in another lock and dam, if this additional water front is required.

In view of the strong and convincing arguments presented in the communication from the board of trade, I have the honor to supplement my report of May 5, with the recommendation that a survey of the Passaic River between Passaic and Paterson be made with a view to determining the feasibility and cost of obtaining a navigable depth of 8 feet at low water by means of locks and dams, the locks to have an available length of 300 feet and width of not less than 40 feet; provided, however, that the work of construction shall not be commenced until the Dundee Water Power and Land Company shall have given a satisfactory permission and guarantee, which shall relieve the United States from all damages and responsibility in regard to the use of their present dam in connection with one of the proposed locks, and shall also release to the United States full control of the water flow of the river to the extent of maintaining a fixed height in the pool, below which said company shall never, under any circumstances, reduce the level of said pool.

Should my recommendation be approved, I respectfully request that $1,000 from the appropriation for "examinations, surveys, and contingencies of rivers and harbors" be allotted with which to make the survey and prepare the necessary map and report.

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

LETTER OF THE PATERSON (N. J.) BOARD OF TRADE.

Paterson, N. J., *November 1, 1899.*

Dear Sir: We understand from a newspaper article published in the Paterson Press of October 23, 1899, a clipping from which we inclose herewith, and in other newspapers of the same date that you have made a report upon the proposed project of extending navigation of the Passaic River to Paterson, and that you have advised the United States Government not to undertake the project until such time as the Dundee Canal Company voluntarily or otherwise opens their canal as required by the law of the State of New Jersey of 1858, from which they derive their charter rights. We also understand from the same newspaper article that in your report you have briefly considered a project for securing navigation to Paterson, ignoring entirely the existence of the present canal, and establishing instead a system of slack-water navigation, but that you have reported that such an enterprise would be very costly, and that there is no great urgent business demand for such navigation. As this question of extending the navigation of the Passaic River to a point within the corporate limits of our city of Paterson is an urgent question upon the part of our manufacturers and business men, and moreover as the public demand for it is widely expressed through our newspapers and at public meetings of our business men, and the necessity of such an improvement is so important to the continued growth and advancement of this growing industrial city and community, that we beg herewith to submit for your consideration some pertinent facts which we trust will have your due attention and consideration in making your final report upon this subject to the United States Government.

This question of extending the navigation of the Passaic River from the city of Passaic to within the corporate limits of the city of Paterson has previously been complicated by the existence of the Dundee Canal, which apparently affords a connecting link between navigation at the city of Passaic and the deep water of the Passaic River above the Dundee Dam at Paterson. The Dundee Canal Company by their charter are compelled to provide navigation, and legal attempts have been made to compel them to live up to the requirements of their charter. When Col. G. L. Gillespie, United States Engineers, made his report on this subject April 10, 1884, he recommended that the project for the improvement of the river be held in abeyance until the State courts decided what the Dundee Canal Company should be required to do under the authority granted by their charter. As we understand, your report at present leaves the subject at the same place that Colonel Gillespie's report left it in 1884, so that it is important to state what may be expected from the Dundee Canal Company. Their charter unquestionably compels them to provide navigation, and if the matter were pushed in the courts there is no doubt whatever that the canal company could be compelled to open up its canal for navigation. But the navigation which the canal company can be compelled to provide is not of such a character as to be of any value at the present time, or under present conditions of transportation. They can be compelled to furnish such navigation as their charter obliges them to furnish, but they can not be compelled to furnish navigation to a greater extent than their charter calls upon them to furnish.

When this canal was built the object was simply to furnish a canal for the use of canal boats alone. Their charter calls upon them to furnish only 4 feet of depth, and the size of the locks is not specified, so that if the matter were pushed to the courts of last resort all that the canal company could be compelled to furnish is 4 feet of depth, and to provide locks simply large enough to accommodate canal boats. In addition, the canal company is authorized to charge a toll of 4 cents per ton per mile on freight, and 5 cents per mile per passenger.

It is evident from the foregoing that the navigation which the Dundee canal company can be compelled to furnish under its charter is totally inadequate, and that the charges would be prohibitory. It would be useless to compel the canal company to provide such navigation, as when provided it would be nearly useless, and provide means for getting canal boats only up the river to Paterson. For these reasons the suit against the Dundee Canal Company has not been pressed to a final issue, because our citizens are aware, notwithstanding the fact that such a suit would be successful, that the object attained would not be worth the trouble involved. Our citizens believe that the business and manufacturing interests of this district warrant the improvement of the Passaic River being undertaken by the United States Government upon much broader lines. They believe that the navigation of the Passaic River should be carried out upon such a plan as to provide for the interests of the community, and that no mere canal project would serve those interests at present, and certainly would not serve them in the future, growing as they are so rapidly.

We desire to present for your consideration some statements showing the importance of the city of Paterson. Paterson is essentially a manufacturing and industrial city, and has had a rapid growth. The population of the city of Paterson in 1880 was 51,031, in 1885 the population was 63,273, in 1890 the population was 78,347, in 1895 the population was 97,344, and it is conservatively estimated that the census of 1900 will show that it has a population of 115,000. There are various outlying communities not in the corporate limits of the city, but practically forming a part of the city, which have a population of about 10,000. The city of Passaic, while a much smaller city, has at the present time a population of about 25,000. So that the proposed extension of the navigation of the Passaic River will benfit a community having a population of 150,000 people. Both Paterson and Passaic are essentially manufacturing cities. The city of Paterson has 300 factories engaged in various industries. It has two large locomotive works, one large steel works, steel-pipe works, extensive machine shops, flax mills, woolen mills, and other industries requiring heavy shipments of raw material, and furnishing large shipments of finished material.

Practically all the building materials used in the city come long distances. Lumber, brick, and stone are expensive because they are required to be brought on railroads, whereas they could be laid down at Paterson very much cheaper if we had water transportation. Lumber from Maine, brick from Haverstraw and Philadelphia, granite and marble from New England, and many other heavy or bulky materials usually carried to New York or to Newark by water can not be delivered at Paterson without breaking bulk. They are unloaded in New York or Jersey City, where the wharfage charges add greatly to the cost of handling, and are then shipped to Paterson by rail. The cost of transportation from New York to Paterson for these materials is twice as much as if vessels could deliver their cargoes at Paterson. Building materials are now sometimes brought up the Passaic River in barges as far as Passaic, and are then carted from Passaic to Paterson. The manufacturing industries of the city of Paterson are estimated to have a value of $100,000,000, and the manufacturing industries of the city of Passaic are estimated to be valued at $25,000,000. The value of the products manufactured in Paterson is estimated to be $100,000,000 annually. The receipts of the internal-revenue office at Paterson are estimated to amount to $1,000,000 for the current year. We state these facts in order to show you that no mere canal navigation will serve the purpose of the needs of such an important growing industrial community.

It is the belief of our citizens that the importance of the interests to be served warrants the United States Government in abandoning the project of canal navigation, and instead improving the main river, so that vessels may come up the river all the way to within the corporate limits of our city. The Passaic River is no unimportant stream. It empties into Newark Bay, which is within the harbor limits of the city of New York. Between Paterson and the mouth of the Passaic River at Newark Bay, counting Newark, Passaic, Paterson, and connected towns, the Passaic River has bordering on its banks a population of not less than 500,000 people. The commerce carried on in the Passaic River in 1895 was estimated to be 1,258,966 tons, valued at $25,658,850. The bulk of this traffic, of course, was carried no farther up the river than Newark, because the improvement of the Passaic River has not been carried far enough to afford the benefits of navigation to more than one-half the population bordering on the banks of the river within navigable limits. The area of the watershed of the Passaic River at the Dundee Dam is 823 square miles. The absolute minimum flow is 150 cubic feet per second. We beg to hand you herewith Volume III of the New Jersey State Geological Survey on water supply, and we refer you to pages 150 to 196 inclusive, as containing a very full description of the maximum, minimum, and average daily flow of the river, which demonstrates the possibility of establishing a slack-water navigation, and of obtaining the necessary flow of water needed for its establishment and operation.

The dam at Dundee is 3½ miles, measured along the river, above the Anderson lumber yards at Passaic, to which point we understand there is a depth of 6 feet now afforded from the mouth of the river. With no great amount of dredging the river could be made navigable up to the bridge at Garfield, which is 1¾ miles below the Dundee Dam. The tide rises and falls in the Passaic River to a point distant about one-half mile below the Dundee Dam. We believe that the river should be made navigable from Passaic up to the Dundee Dam in the following manner, which we propose simply as a suggestion, and not as a fixed engineering solution of the problem. We propose this because we are firmly of the belief and opinion that the only adequate navigation up to Paterson must be secured by utilizing the river, which would permit vessels to come up the river all the way to within the corporate limits of the city of Paterson. We would suggest that the river be dredged from the present head of navigation at Passaic up to a point above the mouth of the brook which empties into the Passaic River, on the east side, at a point about three-quarters of a mile below the Dundee Dam. If a suitable dam were built across the river above the mouth of the brook referred to, the reach from this dam to the Dundee Dam could be made navigable with but a small amount of dredging immediately below the Dundee Dam. The existing dam at Dundee could be utilized for the construction of the necessary lock, and another lock would be needed at the new dam just above the mouth of the brook referred to. By this means vessels could be brought up into the deep water above the Dundee Dam through the two locks. Between the Dundee Dam and the proposed new dam the banks of the river are high, and the amount of land overflowed would be small.

Referring to the depth required for the proposed improvement, it is difficult for us to specify it, as it will depend entirely upon the final depth provided by the United States Government up to Passaic. This depth should be made as much as possible, as it is likely in the future that the demand for greater depth will occur. It seems to us wise to provide the two locks referred to, to agree with the final project of improvement. We believe that the same depth should be afforded up to Paterson as will eventually be afforded up to Passaic. We also believe that the locks should be made of adequate size to accommodate the kind of vessels likely to use the river, which will, of course, depend upon the final depth to be afforded for navigable purposes. We are of the opinion that eventually the river will be deepened to provide a depth of at least 7½ feet at low water up to Passaic, and as the tide rises 3 feet at Passaic, this would give a depth of 10½ feet at high water. At present it is impossible for a tug to bring a barge of more than 100 tons up the river to Passaic. When the river is deepened to 8 feet, barges of 300 tons burden can be brought up the river, and the cost of towing will be but slightly increased. Any project for extending navigation up to Paterson should provide for at least a minimum depth of 8 feet, and the locks should be constructed with such a depth in view. From our understanding of the situation, and the demands likely to be made, the locks should be approximately 50 feet wide, 300 feet long, and provide for a minimum depth of 8 feet.

The improvement of the river as outlined above consists really of extending navigation for a distance of 3½ miles, half of which distance at present is navigable for vessels drawing 6 feet. Such extension of navigation will benefit a community of 150,000 people, engaged almost entirely in manufacturing pursuits.

Above the Dundee Dam the improvement of the river, as previously outlined in the report of 1884 of Col. G. L. Gillespie, remains practically as stated in that report, except that we do not believe that for the present the navigation of the river should be extended farther up the river than to the Susquehanna Railroad Bridge at Hawthorne. Above the Dundee Dam a depth of 8 feet at least should be provided up to Thirty-third Street Bridge, at Morlot's old dye works, and from this point a depth of 6 feet up to the Susquehanna Railroad Bridge at Hawthorne would answer present needs. This would give the city of Paterson 2½ miles of water front with 8 feet depth and an additional 1¾ miles of water front having 6 feet navigable depth. Such an improvement would give the city of Paterson in all 4¼ miles of available water front on navigable river. This water front at the present time is undeveloped, but would soon and very rapidly develop, owing to the location of manufacturing industries needing water transportation.

We beg to hand you herewith copies of the resolutions adopted by the board of aldermen of the city of Paterson, the city council of Passaic, the board of freeholders of Passaic County, the Paterson Board of Trade, and the Paterson Business Men's Association, showing the public demand for such an improvement. It is evident from these resolutions that there is a great demand for this improvement, and the necessity for the improvement also exists. Brick, stone, and lumber for all our building operations are expensive because of the freight rates on the railroads. Brick and stone are not used to the extent that we desire, because of their great cost. If we had navigation that could be brought within our city limits, it would afford a large amount of traffic on the river. Industries requiring large amounts of coal are unfavorably situated because of the cost of coal, and some of the industries of Paterson and upper Passaic require large amounts of coal in their operations. One large industry at Passaic uses 20,000 tons of coal annually, and if it could be brought by water there would be a saving of practically $1 per ton. One large concern in Paterson uses 50,000 tons of coal annually, and the same remark holds true. The people of this community are outspoken in their demand for this improvement to be undertaken. The subject is an old one, and has been agitated from time to time, but as time goes by, the necessity of the improvement becomes more apparent and the demand for it becomes greater.

We trust that you will take this communication into consideration, and hope that it will have due weight in showing you the necessity and the demand for the improvement of the Passaic River, and the extension of the navigation from Passaic to Paterson upon the broad lines so necessary for the service of this community.

Very respectfully, yours,

THE PATERSON BOARD OF TRADE.
G. H. BLAKELEY,
President.
W. G. SCOTT,
Secretary.

Col. J. W. BARLOW,
United States Engineers.

CLIPPING FROM THE DAILY PRESS, OF PATERSON, N. J., OF OCTOBER 23, 1899.

COY ON RIVER NAVIGATION—GOVERNMENT ENGINEER'S REPORT NOT OVERENTHUSIASTIC—WOULD WAIT FOR OPEN CANAL—SAYS THERE IS NO URGENT BUSINESS DEMAND FOR FREIGHTING BY WATER TO THIS CITY—CONGRESSMAN STEWART GETS A LOOK AT THE DOCUMENT IN ADVANCE AND POSTS HIS ANXIOUS CONSTITUENTS.

Congressman Stewart has arrived home from Washington, and was at his office in the Paterson Savings Institution Building this morning, where he was visited by a large number of citizens interested in river navigation, who were anxious about the story that Colonel Barlow, the Government engineer, had made a report that frowned on the navigation project. Judge Stewart called at the War Department on Friday last, and had a talk with Colonel Mackenzie, who is in charge of the engineer's division. Colonel Barlow had on file a lengthy report on the improvement of the Passaic River at different points, and this document will be presented to Congress at the next session. The Department did not want to give out the full report until after it had first been sent to Congress, as they did not think it courtesy to have published and sent broadcast any document that was meant for the House. The Congressman, however, was accorded the privilege of looking over the report that deals with improvements around Newark, and also farther out, and it touches the local question in the following language:

"There is no great urgent business demand for the navigation of the Passaic River to Paterson. The principal manufactured product at Paterson is in silk goods, which are now shipped by rail, and in my opinion would be continued that way even if the river was opened up to navigation. Under no circumstances would I advise the Government of the United States to undertake the project until such time as the Dundee Canal Manufacturing Company voluntarily or otherwise opened their canal for the navigation of passengers or freight, as they are required to do under the law of 1858. By ignoring the said canal as a means of navigation for freight and passengers, and establishing a system of slack-water navigation, would be a very costly enterprise. However, I consider the enterprise would be a worthy one and of great value to Paterson in cheapening the price of freight, and it would also be the means of establishing many new industries along the line of the river up to that city."

Judge Stewart remarked that the last sentence covered nearly the whole ground so far as the argument in favor of navigation for this city was concerned, except that much more could be added, and will be when the time arrives for a delegation from this city to appear with him in Washington in behalf of the project. The meaning of "slack-water system" as referred to in Colonel Barlow's report is the opening of the river independent of the Dundee Canal, and many of those in Paterson interested in the movement think it should be done in that way. Judge Stewart says he is going to try, if possible, to have the cost estimated on both the slack-water and canal systems, and then allow the citizens to choose which they will have in case he is successful in having the great improvement recommended by Congress. He seems to think there are good prospects, and there is one thing sure, it will be through no fault of his if it does not come. There is $15,000 in hand for a survey now, and he feels certain he can get at least that much more.

LETTER OF THE CITY CLERK OF PATERSON, N. J.

CITY OF PATERSON,
OFFICE OF THE CITY CLERK,
October 28, 1899.

DEAR SIR: Inclosed please find copy of preamble and resolution as adopted by the board of aldermen of the city of Paterson, N. J., at a meeting of said board of aldermen on May 15, 1899.

Respectfully,

GEO. BOYD,
City Clerk.

WILLIAM G. SCOTT, Esq.

RESOLUTION ADOPTED BY THE BOARD OF ALDERMEN OF PATERSON, N. J., AT A MEETING HELD MAY 15, 1899.

OCTOBER 28, 1899.

Whereas, the United States Government has appropriated a certain sum of money for the purpose of surveys, to ascertain the practicability of making the Passaic River navigable up to this city; therefore be it

Resolved, That this board express its appreciation of the said action and request and urge that the United States Government take the necessary steps to render the said river navigable, and the mayor of the city is authorized to use such measures as in his opinion will conduce to said end.

On motion of Alderman Wiley the above resolution was adopted by the board.

SYLVESTER F. WILEY.

Attest:
GEO. BOYD, [SEAL.]
City Clerk.

LETTER OF THE CITY CLERK OF PASSAIC, N. J.

OFFICE OF THE CITY CLERK,
CITY OF PASSAIC, N. J.,
Passaic, N. J., October 27, 1899.

DEAR SIR: Yours of the 26th instant at hand. The following resolution was adopted by the city council of the city of Passaic, at a meeting held on Monday, May 15, 1899:

"*Resolved*, That it is the desire of the people of Passaic that the Passaic River be improved so as to afford a depth of not less than 10 feet at low water.

"*Resolved*, That the city clerk be and hereby is instructed to forward an official copy of the above resolution to Col. J. W. Barlow, United States Engineers."

Respectfully, yours,

R. B. TINDALL,
City Clerk.

Mr. G. H. BLAKELEY,
President Paterson Board of Trade, Paterson, N. J.

RESOLUTION PASSED BY THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF PASSAIC AT A REGULAR MEETING HELD AT PATERSON, N. J., JUNE 6, 1899.

Whereas the United States Government has taken steps toward the improvement of the Passaic River, and is about to make surveys preliminary to increasing the navigable depth of the river from Newark to Passaic, and ascertaining the feasibility of extending navigation of the river from Passaic to Paterson;

Resolved, That the board of chosen freeholders of Passaic County, thoroughly cognizant of the incalculable benefits to be derived by this important and growing industrial county from such improvement, hereby expresses its approval of the project, and recommends to the Government officers in charge of the work that in order to secure the full benefit of such improvement that a minimum depth of 10 feet be provided to a point situated well within the city limits of Paterson, and that the locks and equipment be of the same kind and size as those installed by the United States Engineers in the improvement of the Great Kanawha River in West Virginia, such improvement being commensurate with the needs of the vast industrial interests of this county to be served.

Which was agreed to.

RESOLUTION ADOPTED BY THE PATERSON (N. J.) BOARD OF TRADE AT A MEETING HELD MAY 9, 1899.

At a meeting of the Paterson Board of Trade held on Tuesday evening, May 9, 1899, the following resolution was unanimously adopted:

Whereas the Paterson Board of Trade earnestly desires to bring to the attention of Col. J. W. Barlow, United States Army, Corps of Engineers, the desirability of improving the Passaic River, and is unanimously in favor of such improvement, to provide navigation of the Passaic River to a point situated well within our city limits;

Resolved, That, in order to receive the full benefit of such improvement under the present and near future condition of transportation, we recommend that a minimum depth of 10 feet be provided to a point as near Thirty-third Street Bridge as possible, and that the locks be approximately 300 feet long and 40 feet wide, or of sufficient size to accommodate steam vessels carrying imports to deliver their cargoes at Paterson without breaking bulk.

W. G. SCOTT,
Secretary.

RESOLUTIONS PASSED BY THE BUSINESS MEN'S ASSOCIATION OF PATERSON, N. J., IN REFERENCE TO THE IMPROVEMENT OF THE PASSAIC RIVER.

Whereas the attention of the Business Men's Association has been called to the statement made by Col. J. W. Barlow, United States Army, Corps of Engineers, that it is practicable to dredge the Passaic River to a depth making it navigable for vessels in river and ocean service to a point within our city limits; and

Whereas the output of manufactured goods in this Congressional district reaches the value of over $1,000,000 per annum, three-fourths of which is from the city of Paterson, and the value of which we believe would be doubled if the river were made navigable: Therefore

Be it resolved, That the Business Men's Association is emphatically in favor of said project and promise our unqualified support to this great and growing necessity, which we know will greatly add to our standing as a commercial city.

Be it further resolved, That in order to secure the full benefit of the improvement a minimum depth of 10 feet be provided to a point as near Thirty-third Street Bridge as possible, and that the locks be 300 by 40 feet, or of sufficient size to accommodate steamers carrying imports to deliver their cargoes well within our city limits without breaking bulk.

SURVEY OF PASSAIC RIVER, NEW JERSEY, WITH A VIEW OF OBTAINING A CHANNEL 10 FEET DEEP FROM CENTER STREET BRIDGE, NEWARK, TO MONTCLAIR RAILWAY BRIDGE, AND 12 FEET DEEP FROM CENTER STREET BRIDGE, NEWARK, TO STATEN ISLAND SOUND.

UNITED STATES ENGINEER OFFICE,
New York City, December 30, 1899.

GENERAL: I have the honor to submit the following report on a survey of Passaic River, New Jersey, with a view of ascertaining the cost and feasibility of extending a 10-foot channel of suitable width from Center Street Bridge to the Montclair Railway Bridge; and also as to the feasibility and cost of affording a channel 12 feet in depth from Center Street Bridge to Staten Island Sound, as provided for in river and harbor act of March 3, 1899, and which was assigned to my charge by Department letter of August 18, 1899:

The Passaic River, New Jersey, is tributary to the waters of New York Harbor. The sources are in the Highlands of northern New Jersey, 80 miles above the outlet in Newark Bay. The Hackensack and Passaic rivers merge and flow together through Newark Bay and reach New York Harbor by way of the kills between Staten Island and New Jersey. The Passaic River is a tidal stream and navigable as far as the Dundee Rapids, a distance of 15 miles. Above Dundee the river drains an area of over 800 square miles. The tidal wave ascends the river to the upper limits of the city of Newark, a distance of 6 miles, without diminution. Above Newark the river bed rises slowly, is obstructed in places by glacial drift and by the outcrop of the lower red sandstone plane. The tidal range of 4.7 feet at the mouth is reduced to a range of about 2 feet just below the Dundee Rapids.

The improvement of the Passaic River by the United States was undertaken in 1872, under a project to obtain a depth of from 6 to 7½ feet from Center street, Newark, to Passaic City. This or a greater depth existed below Center street. In 1880 the improvement of Newark Bay and the lower Passaic was commenced, under a project to obtain a depth of 10 feet at mean low water as far as Center street, Newark, where the old project for the improvement of the upper river began.

These projects have been in force up to the present time. The estimated cost exceeds the total amount appropriated by $79,347. The work remaining to be done under these projects is largely the construction of dikes below Newark (of doubtful utility) and the widening and deepening of the channel at certain sections above Newark. The requirements of commerce, however, have outgrown the accommodations provided for in these unfinished projects. The city of Newark extends along the right bank of the river and bay a distance of 8 miles. On the opposite shores are the communities of Bayonne, Kearney, Harrison, and Arlington. Within this section a total of 30,000 linear feet of water front have been improved and occupied for purposes of commerce. The city of Newark has under consideration the reclamation by the municipality of thousands of acres of low lands within the city limits bordering on the river and bay. The commerce, estimated in 1880 at 1,000,000 tons, had increased to 1,500,000 tons in 1898.

An examination of the entire river from Newark to Paterson, a city 5 miles above the present head of navigation, was made and report submitted May 5, 1899, recommending an increased channel depth in the lower part of the river and the securing of the present project depth at all points on the upper part of the river.

A detailed project with estimates of cost is now submitted, based upon surveys and examinations comprising detail soundings in some localities; the measurement of channel dimensions, inspection of dredged channels, and the location of projecting bowlders in other localities. A map[1] showing detail soundings and proposed channel lines between Center street, Newark, and the Greenwood Lake and Montclair Railroad Bridge accompanies this report.

In the wording of the river and harbor act of 1899, providing for a preliminary examination and survey, Center street is retained as the dividing line between a greater project for the lower river and a lesser project above. Center street, however, is in the heart of the city. Above Center street the water front has been developed since 1880 to a greater extent than below Center street. Along this section, for a distance of 8,000 linear feet, there has been improved and utilized on the two shores a total of 15,000 linear feet of dock front. The improved frontage along the entire river below Center street, including Newark Bay, does not exceed this in length.

An investigation of the detailed reports of annual commerce of the river shows that the tonnage along the section, 8,000 feet above Center street, is 80 per cent of the total tonnage of the river below Center street. This section has never been improved, as the available depth was equal to that required under a project for the upper river, 7½ feet at mean low water, and the later project for an increased depth of 10 feet was limited to the section below Center street. The development along this section of the river has taken place notwithstanding the restricted depth, but has now reached a condition where further development must cease and the present business decline unless a greater draft of water can be secured.

The requirements of traffic, as explained above, and the physical characteristics of the stream as well, make it preferable to continue the project with a depth of 12 feet to a point distant 8,000 feet above Center street, to the Nairn Linoleum Works. The low-lying banks of the river, the alluvial nature of the river bed, and the undiminished tidal force continue to this point, so that all of the conditions are practically the same as below Center street. They are even more favorable for maintenance, as the docks are constructed on both banks of the river for nearly the entire distance, giving a contracted and more nearly uniform cross section than exists below Center street.

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[1] Not reprinted. Printed in House Doc. No. 401, Fifty-sixth Congress, first session.

PROJECT FOR A CHANNEL 12 FEET DEEP AT MEAN LOW WATER AND 200 FEET WIDE FROM DEEP WATER IN NEWARK BAY TO THE NAIRM LINOLEUM WORKS.

The distance from deep water in Newark Bay to the Nairm Linoleum Works is about 48,000 feet. Of this distance, 39,600 feet require deepening over the full channel width of 200 feet; a further distance of 6,000 feet requires widening. The depth of cutting is light at most localities, and will average about 2 feet, without allowance for overdepth. The method recommended is dredging, unaided by additional dikes, except at one reach. The section most subject to shoaling is the last reach in the river at the entrance to the bay. A dike at this place was provided for in the existing project, but has not been built. With an increase in the depth of the dredged channel, a dike to contract the channel would be more economical than dredging. A training dike has been constructed in Newark Bay under the present project for a length of 6,000 feet. The existing project provides for a further extension of 5,800 feet. This project was adopted before any dredging had been tried on the shoals below the dike. The upper shoal, 2,000 feet below the end of the dike, was dredged in 1884 to a depth of 10 feet at mean low water, and nearly this depth has been continuously maintained for narrow widths.

A shoal 6,000 feet below the dike was dredged in 1896 to a depth of 12 feet. The recent examination shows that in places this depth now exists, while in other sections the depth has shoaled to about 11 feet. Owing to the great length of dike required to reach the deep water in the lower bay and so prevent the transfer of the shoals down to the bay, it would seem advisable to first try dredging alone before making any extension to the present dike. A map showing this locality is contained in the Report of the Chief of Engineers for 1897. The earlier dredging under the existing project being for partial widths and lengths was subject to serious shoaling. As the improvement reached larger proportions the benefit of an increased section and tidal volume became apparent. This was especially noticeable at the outlet of the river, and the indications are that channels of the section now proposed will be in large measure self-maintaining, provided the entire work could be executed in a short period.

Estimate of cost.

For channel 200 feet wide and 12 feet deep from Newark Bay to Nairm Linoleum Works:	
Dredging 1,214,000 cubic yards material, at 15 cents	$182,100
Diking 5,000 linear feet, at $5.50	27,500
Engineering and contingencies	20,400
Total	230,000
To continue a depth of 10 feet from the Nairm Linoleum Works to the Montclair and Greenwood Lake Railroad Bridge would cost in addition.	66,000
From the Nairm Linoleum Works to the Montclair and Greenwood Lake Railroad Bridge a depth of 8 feet is ample, and the estimated cost for a channel of this depth is	43,000

The latter estimate will be made a part of a project for the improvement of the river from the Nairm Linoleum Works to Paterson, to be submitted in connection with the report of a survey of the Dundee Rapids now being made.

If it is deemed advisable to terminate the depth of 12 feet at Center street and to extend the depth of 10 feet as far as the Montclair and Greenwood Lake Railroad Bridge, the estimated cost is as follows:

Channel 12 feet deep to Center street	$182,000
Channel 10 feet deep between Center street and Montclair and Greenwood Lake Railroad Bridge	97,000
Total	279,000

The yearly cost of maintenance under any project is estimated at $5,000.

The project recommended provides for a depth of 12 feet as far as the water front has been developed in the city of Newark, with ample facilities for the remaining distance to the railway bridge, and can be obtained at less cost than the execution of the project as outlined in the act.

The survey was made under the direction of Mr. C. S. Kelsey, assistant engineer, to whose report herewith attention is invited.

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

REPORT OF MR. C. S. KELSEY, ASSISTANT ENGINEER.

United States Engineer Office,
New York City, December 30, 1899.

Colonel: I have the honor to submit herewith a map of the survey of the Passaic River, New Jersey, from Center street, Newark, to the Montclair and Greenwood Lake Railroad Bridge, made in compliance with your verbal instructions.

This survey was authorized late in August together with preliminary surveys of other waterways in this district. The field work was executed in October, the survey party being transferred from other work, which was suspended in order to advance the Passaic survey. The notes of the survey were plotted and the map made during December, the drafting department meanwhile being engaged on other work equally important.

It was not deemed necessary to make detailed surveys below Center street, as surveys of this locality were made in 1891, 1892, and 1896. The present dimensions of the channel were ascertained by measurements taken at characteristic points. The results indicate the probable success of a project to increase the present depth by dredging. It is not considered necessary to provide in the project for an extension of the dike in Newark Bay. The training dike at the entrance of the river into Newark Bay, provided for in the existing project, could be built to advantage by making a change in its direction.

The channel width of the existing project, 200 feet, was retained in the proposed project. In making estimate of quantities, 1 foot allowance was made for overdepth, side slopes were computed for 1 vertical on 3 horizontal, and 25 per cent was added to obtain the equivalent scow measurement.

The material is believed to be mud in Newark Bay and mud and sand in the river. The unit rate of 15 cents per cubic yard, used in making the estimate of cost, is an average rate obtained by assuming rates varying with the distance of the work from Newark Bay. In supplementary estimates the rate used varied from 12 to 25 cents, depending upon the locality and the depth of cutting. These rates are low, but in accord with the prices for dredging now prevailing.

Part of the material to be removed can be placed behind Government dikes built or provided for in the project. The greater part must be towed to sea unless additional bulkheads are erected along the banks by the riparian owners and the lowlands reclaimed. The latter would be of assistance in maintaining the dredged channel by contraction of the cross section.

Detailed estimates of the cost of projects of different dimensions are submitted herewith.

Instructions to make a survey of the Dundee Rapids were received late in November, 1899. This survey is now in progress. Upon its completion, the present project from the Montclair and Greenwood Lake Railroad Bridge to the city of Passaic will be revised, and a project for the extension of the improvement to the city of Paterson will be prepared.

Respectfully submitted.

C. S. Kelsey,
Assistant Engineer.

Col. J. W. Barlow,
Corps of Engineers.

Detailed estimates of the cost of projects for channels of different dimensions for lower Passaic River.

Estimated cost of a channel 12 feet deep and 200 feet wide from Newark Bay to the Nairm Linoleum Works:

1,214,000 cubic yards dredging, at 15 cents	$182,100
5,000 linear feet dike construction, at $5.50	27,500
Add for engineering and contingencies	20,400
Total	230,000

Estimated cost of a channel 8 feet deep and 200 feet wide from the Nairm Linoleum Works to the Montclair and Greenwood Lake Railroad Bridge:

110,000 cubic yards dredging, at 25 cents	$27,500
4,000 linear feet dike construction, at $3	12,000
Add for engineering and contingencies	3,500
Total	43,000

Estimated cost of a channel 12 feet deep and 200 feet wide, from Newark Bay to Center street, Newark:

906,000 cubic yards dredging, at 15 cents	$135,900
5,000 linear feet dike construction, at $5.50	27,500
Add for engineering and contingencies	18,600
Total	182,000

Estimated cost of a channel 10 feet deep and 200 feet wide, from Center street, Newark, to the Montclair and Greenwood Lake Railroad Bridge:

382,000 cubic yards dredging, at 20 cents	$76,400
4,000 linear feet dike construction, at $3	12,000
Add for engineering and contingencies	8,600
Total	97,000

SURVEY OF PASSAIC RIVER, NEW JERSEY, FROM MONTCLAIR RAILWAY BRIDGE TO PATERSON.

United States Engineer Office,
New York City, January 31, 1900.

General: I have the honor to submit the following report of a survey and estimate of cost of improving Passaic River from the Montclair Railroad Bridge to the city of Paterson, N. J., made in compliance with river and harbor act of March 3, 1899.

In the report of May 5, 1899, on a preliminary examination, it was stated that this part of the river was worthy of improvement provided the Dundee Water Power and Land Cómpany shall open to navigation its canal from near the mouth of Weasel Brook to the pool above its dam, as seems to have been originally contemplated.

Upon a further statement of the conditions presented by the citizens of Paterson, it became evident that such navigation as would be afforded by the Dundee Water Power and Land Company would not be satisfactory, and that an independent and larger waterway was needed.

The recommendation in my letter of November 13, 1899, for a further survey was authorized by Department letter of November 24, 1899.

A field party, under the direction of Mr. C. S. Kelsey, assistant engineer, commenced operations on December 1 1899, completing the work on the 27th of the same month. Mr. Kelsey's report on the survey is transmitted herewith, to which attention is invited.

The plan now under consideration is to extend the navigable channel of the Passaic River by dredging, as far as practicable, and then to leave the river, continuing navigation by a lateral canal, with locks, as far as the pool above the Dundee Dam. the difference in elevation between tide water and the pool varying from 24 to 27 feet.

The survey developed the following conditions: The material of the river bed is sand and silt, easily removed by dredging. The banks of the river on each side above the point where it would not be economical to continue the excavation are convenient for canal construction, but the locks will require pile foundations.

Owing to the insecure nature of the river bed, and other considerations, cross dams in connection with the locks are not deemed advisable.

A lateral canal, 3,500 feet long, with two lift locks and one guard lock, can be located on the right bank of the river, as shown on the accompanying map. The locks are to have interior dimensions of 200 by 35 feet and a depth of water on miter sills of 10 feet at mean high tide. The lower miter sill will have a depth of 8 feet at low tide, which is the depth proposed for the open river.

The location on the left bank would require the canal to be 6,000 feet long, with the same number of locks.

Both sides possess advantages and disadvantages. On the right bank the right of way can be obtained from the Dundee Water Power and Land Company without cost, but objection is raised to using any part of its canal; consequently, the proposed canal must enter the pool through the dam, and will thus shorten the spillway about 50 feet. As this spillway, now 450 feet long, is not excessive, its reduction is undesirable. Besides the above objection, the approach to the canal from above would be unsatisfactory, as it would be placed between the spillway and the intake of the water-power canal.

For these reasons, I am in favor of locating the canal on the opposite bank. Here the topographical features are not as desirable, and a part of the right of way will have to be purchased. The Dundee Water Power and Land Company will grant a free right of way over the land which it controls, extending from the dam downstream about 2,500 feet. It is believed that the remainder of the route can be acquired upon reasonable terms. The advantages of this site are that the canal can enter the pool without disturbing or shortening the present dam, and its approach from above will have control of the adjacent bank of the pool, along which vessels may be moored.

These considerations lead me to favor the location of the canal on the left side of the river, although the present estimates considerably exceed in cost those for the opposite location.

The canal on the east or left bank would be extended downstream 2,500 feet farther than the other, which will bring its outlet below the rapids, and will correspondingly reduce the length of the dredged channel. By placing two of the locks together, or substituting a single lift lock, some saving will result. The necessity for a considerable length of retaining wall is an expensive feature of this location.

It is proposed, for the sake of economy, to build the locks of concrete; the upper or guard lock will rest on bed rock; the others must be provided with pile foundations.

It was stated in my preliminary report that this improvement was then considered worthy, and the present survey and estimates confirm that opinion.

The plan as outlined in the present project contemplates extending the 8-foot navigation on Passaic River as far as the pool above the Dundee Water Power and Land Company's Dam. The survey of 1883 shows that a depth of 10 feet can be carried nearly two miles above this dam, and a depth of 8 feet 1,000 feet farther. This river front, if connected with tide water, as proposed in the present project, will afford ample space for the prospective industries contemplated at Paterson without carrying the improvement of the river any farther.

To extend the same depth 1½ miles farther up would involve the excavation of considerable ledge rock, at a cost which may not be justified under present conditions; if in the future this extension is found necessary, a project with that view could then be considered.

It is understood that the Dundee Water Power and Land Company will afford all reasonable facilities for carrying this project into execution. It will grant free right of way over its lands, will permit free entry into the pool above the dam, and will restrict the use of water by mill owners so that the pool shall never be drawn down below a fixed level, namely, one foot below the present crest of the dam; also, that the dam, which is a permanent stone structure, will be maintained by the company without expense to the United States. These concessions have been verbally promised, but before work is undertaken by the Government I would recommend that they be guaranteed in proper legal form.

In its communication of January, 1900, the board of chosen freeholders of Passaic County have promised that the expense of changing all bridges, so as to admit navigation through them, will be borne by the county, and no expense in that connection will have to be incurred by the United States.

The following estimates are submitted, based upon present prices, and with the understanding that the work be done under large contracts. These estimates are shown more in detail in the report of the assistant engineer submitted herewith.

Estimate of cost of a channel 10 feet deep at high water, or 8 feet deep at low water, from the Montclair Railroad Bridge to Dundee Dam.

VIA CANAL ON EAST SHORE.

From Montclair Railroad Bridge to head of navigation	$203,258
From head of navigation to Dundee Dam	657,305
Total	860,563

VIA CANAL ON WEST SHORE.

From Montclair Railroad Bridge to head of navigation	$203,258
From head of navigation to Dundee Dam	518,144
Total	721,402

Very respectfully, your obedient servant,

J. W. BARLOW,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

REPORT OF MR. C. S. KELSEY, ASSISTANT ENGINEER.

NEW YORK, *January 31, 1900.*

COLONEL: I have the honor to submit the following report of a survey of the Passaic River from Gregory avenue, Passaic, to the Dundee Dam, made in compliance with your verbal instructions, together with estimates of the cost of a project to obtain a depth of 8 feet at mean low water from the Montclair and Greenwood Lake Railroad Bridge, Newark, to Thirty-third street in Paterson.

The field work of the survey was commenced December 1 and completed December 27, 1899. Some additional surveying was done in January, 1900. Levels were run to check the levels of previous surveys and to establish bench marks convenient for detailed level work. The locations were made by a traverse line, connecting the survey of 1889 below Passaic with the survey of 1883 above Dundee Dam. Detail soundings were taken below Weasel Brook, and scattered soundings between the brook and the dam. The topography for some distance back from both shores was developed by level and stadia. Comparative tidal observations were made at four gauges located at intervals within the limits of tidal action. Borings with a rod were made along the line of the proposed open-river channel.

Five borings were made to bed rock at selected points by contract. Soundings were taken in the upper end of the raceway of the Dundee Water Power and Land Company. The record of the river stages kept at the dam by this company was freely copied. The extreme flood heights and the discharge during time of flood and drought are matters of record.

Five different plans for carrying the navigation up to Dundee Lake from the present head of navigation in the Passaic River, which is 4,000 feet above the outlet of Weasel Brook, were considered.

A plan to enter the canal and raceway of the Dundee Water Power and Land Company, just above the Belmont Railway trestle, making a joint use of the canal from this point to the dam, and a second plan to enter the canal just below the dam, rebuilding the present lock and providing an independent raceway and gates, were both rejected because of opposition from the power company.

A plan to obtain slack-water navigation for a portion of the distance by construction of a second dam was rejected, as a location could not be had for a sufficient distance downstream to be of utility.

The plans as shown on the map, and for which estimates are submitted, are for a canal located on the east shore of the river and an alternate location on the west shore, each of which has advantages.

The lower locks provide a depth of 8 feet over the lower miter sill at low-water stage, estimated to give a depth of no less than 10 feet over the sill at high tide, during low stages of the river. The depth on all other lock sills is 10 feet. The clear length provided for in the lock chambers is 200 feet, the clear width 35 feet. The bottom width of the canal is 60 feet. The entire lift to be overcome varies from 24 to 27 feet. During extreme flood stage, for short periods, navigation above Weasel Brook may not be practicable.

The line located on the east shore enables the canal to be carried 2,500 feet farther downstream than under the alternate plan, which is an advantage. The entrance into the lake at the eastern end of the dam is favorable to navigation and does not reduce the length of the spillway over the dam. Its disadvantages are the exposed condition of the portion of the canal bank to the river currents, the greater value of the land occupied, the alterations required in roads, culverts, and the bridge which it crosses, the necessary purchase of a part of the right of way, and the greater cost.

The line on the west shore requires that the canal come into the river before the foot of the rapids is reached, in order to maintain the river section required in time of flood. This part of the open-river channel would be protected by a dike shown on the plan. The lock at the lake entrance encroaches on the spillway, and may require the lengthening of the dam on the eastern side. It will require the rebuilding of the west gates and spillway of the present canal and raceway. It presents less difficulties along the line of the canal, and the right of way is offered by the power company.

The estimates of cost submitted are based on the survey of 1889 from the Montclair and Greenwood Lake Railroad Bridge, Newark, to Gregory avenue, Passaic, supplemented by an examination made in April, 1889, upon the survey of 1883 above the Dundee Dam, and upon the present survey below the dam. It is assumed that the work is to be done under large contracts.

The distance from the Montclair and Greenwood Lake Railroad Bridge, Newark, to the present head of navigation is 7½ miles. Of this distance, 8,000 feet now has the proposed width and depth; 11,000 feet will require widening, and 20,000 feet will require deepening for the full width of the project. The distance from the present head of navigation to the outlet lock of the proposed canal on the east side of the river is 6,000 feet, on the west side 8,500 feet. The proposed canal on the east side is about 6,000 feet long, on the west side 3,500 feet long.

Above Dundee Dam, the survey of 1883 shows that a depth of 10 feet can be carried for a distance of 10,000 feet above the dam, a depth of 8 feet for an additional distance of 1,000 feet.

Estimates of cost.

For a channel 150 feet wide and 8 feet deep at low water or 10 feet at high water from the Montclair and Greenwood Lake Railroad Bridge to the head of navigation (4,000 feet above Weasel Brook):	
Dredging 452,600 cubic yards, at 30 cents	$135,780
Removing 8,000 cubic yards bowlders, at $4	32,000
Removing 3,400 cubic yards rock, at $5	17,000
	184,780
Engineering and contingencies	18,478
Total	203,258
For a channel 150 feet wide and 8 feet deep at low water or 10 feet at high water from head of navigation to Dundee Rapids, and thence by canal 10 feet deep to Dundee Dam:	
Via canal on east shore—	
Dredging 277,000 cubic yards, at 30 cents	$83,000
Canal 6,000 feet long, with one double and one single lift lock	481,550
Right of way	33,000
	597,550
Engineering and contingencies	59,755
Total	657,305
Via canal on west shore—	
Dredging 421,000 cubic yards, at 30 cents	$126,300
Dikes, 1,500 linear feet, at $16	24,000
Canal 3,500 feet long, with three single lift locks	320,740
	471,040
Engineering and contingencies	47,104
Total	518,144

For a channel 100 feet wide and 10 feet deep from Dundee Dam to foot of Thirty-third street, Paterson, 3½ miles above dam:

Dredging 24,430 cubic yards, at 50 cents	$12,215
Removing 102,370 cubic yards rock, at $2	204,740
	216,955
Engineering and contingencies	21,695
Total	238,650

No provision is made in the estimate for the alteration of the four fixed bridges crossing the proposed waterway below the dam and three above the dam.

Respectfully submitted.

C. S. Kelsey,
Assistant Engineer.

Col. J. W. Barlow,
Corps of Engineers.

H 24.

EXAMINATION AND SURVEY OF WOODBRIDGE CREEK, NEW JERSEY.

[Printed in House Doc. No. 282, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 9, 1900.

Sir: I have the honor to submit the accompanying copies of reports dated May 2 and December 18, 1899, with map,[1] by Col. J. W. Barlow, Corps of Engineers, upon preliminary examination and survey, respectively, of Woodbridge Creek, New Jersey, made to comply with requirements of the river and harbor act of March 3, 1899.

Colonel Barlow states that the important and increasing commerce of Woobridge Creek will, it is believed, justify the cost of making and maintaining a channel 8 feet deep at mean low water, with a bottom width of 50 feet, and a project is presented for securing such a channel, by dredging, from Arthur Kill to Salamander Dock, estimated to cost, including contingencies, $35,000, and $3,000 annually for maintenance.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF WOODBRIDGE CREEK, NEW JERSEY.

United States Engineer Office,
New York City, May 2, 1899.

General: I have the honor to submit the following report upon a preliminary examination of Woodbridge Creek, New Jersey, made in compliance with section 22 of the river and harbor act of March 3, 1899, and pursuant to Department letter of April 14, 1899.

Woodbridge Creek, a small stream in the northeastern part of New

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[1] Not reprinted. Printed in House Doc. No. 282, Fifty-sixth Congress, first session.

Jersey, empties into the Arthur Kill, or Staten Island Sound, and is one of its most important tributaries. In its natural condition there was a mean low-water depth of about 2 feet at the Woodbridge docks and 4½ on the bar at the mouth.

A survey embracing the navigable portion of this stream, from the mouth to Boynton Beach Road, a distance of 2⅝ miles, was made in the fall of 1878, and a project was prepared for its improvement.

This project, adopted by the river and harbor act of March 3, 1879, proposed a uniform depth of 12 feet at mean *high* water in a channel 80 feet wide from the mouth of the creek as far up as Salamander Dock, at an estimated cost of $13,000, which amount was increased in 1884 to $29,000.

Work was carried on from 1879 to 1883, during which time $19,000 was expended without completing the project. No appropriation for the work has been made since.

Since suspension of work so much shoaling has taken place in the creek that only light-draft vessels can navigate it, consequently commerce is very much restricted. It is believed that if the depth is increased to 8 feet at mean low water there will be a corresponding increase in the amount of commerce, as the country traversed by the creek is one of the finest and most valuable clay regions in the United States. Numerous fine brick, tile, and drainpipe works are located along the banks, and clay is shipped to all parts of the country.

During the past year the commerce amounted to about 176,000 tons, consisting mainly of clay and manufactured articles, and was carried in sailing vessels and barges.

This stream is considered worthy of further improvement by the United States, and a survey to determine the location and amount of dredging required is recommended at a cost of $200.

Very respectfully, your obedient servant,

J. W. BARLOW,
Colonel, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the river and harbor act of March 3, 1899, a preliminary examination has been made of Woodbridge Creek, New Jersey.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF WOODBRIDGE CREEK, NEW JERSEY.

United States Engineer Office,
New York City, December 18, 1899.

General: I have the honor to submit the following report on the survey of Woodbridge Creek, New Jersey, made in compliance with the provisions of the river and harbor act of March 3, 1899:

A preliminary examination, as required by the same act, was made and report submitted May 2, 1899, to which attention is invited.

The field work of the survey was executed under the supervision of Mr. C. S. Kelsey, assistant engineer, whose report thereon is submitted herewith.

Under previous appropriations Woodbridge Creek was improved by the United States between 1878 and 1883, at a total cost of $19,000. The project provided for dredging to a depth of 12 feet at mean high water from the mouth of the creek to the Salamander Dock, a distance of about 2 miles, and the construction of a short dike. The original estimate of $13,800 was increased in 1884 to $29,000.

In 1888 the creek was dropped from the list of river and harbor improvements.

Since work was suspended business along the bank of the creek has largely increased, due to the extensive use of a clay found along its course, which is transported either in a raw state or in many of its manufactured forms, such as brick, tile, etc. The annual commerce in 1898 was estimated at 176,000 tons. The present channel of the creek is inadequate for the needs of this traffic.

The present commerce requires a channel 8 feet deep at mean low water as far as the Salamander Dock, the upper landing in this creek. The small craft engaged in the transportation of manufactured products will thus be accommodated at all stages of the tide, while the large vessels engaged in transporting clay will be able at high water to load to a depth of 12 or 13 feet.

It is not expected that this proposed depth will be permanent, and periodical redredging will probably be necessary.

The important and increasing commerce of Woodbridge Creek is believed to justify the cost of making and maintaining a channel 8 feet deep at mean low water, with a width at bottom of 50 feet, the estimates for which are as follows:

Dredging from Arthur Kill to Salamander Dock, a distance of 2 miles, requiring the removal of—	
128,000 cubic yards of material, scow measurement, at 25 cents	$32,000
Engineering and contingencies	3,000
Total	35,000
Annual dredging, 12,000 cubic yards of material, scow measurement, at 25 cents	3,000

Very respectfully, your obedient servant,

J. W. Barlow,
Colonel, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

REPORT OF MR. C. S. KELSEY, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
New York, N. Y., December 18, 1899.

COLONEL: I have the honor to submit the following report on a preliminary survey of Woodbridge Creek, New Jersey.

The survey was made in October in connection with a preliminary survey of the Arthur Kill, which is the outlet of Woodbridge Creek.

The physical characteristics of the stream are fully stated in the report on the original survey of Woodbridge Creek, made in 1878. A comparison of the recent survey with the survey of 1878 shows little trace of the dredging done during the years from 1878 to 1883. There is an increase in depth at the mouth of the creek of 1.5 feet; elsewhere the channel has reverted to its former condition or shoaled to a less depth. The present depth for 1 mile above the Arthur Kill, or as far as the Addick Works, is from 7 to 8 feet at mean low water along the reaches and from 9 to 15 feet at the bends. For one-half mile above the Addick Works the depth of the reaches is reduced to 5 feet and at the bends to 6 to 8 feet. Opposite and above Valentine's the center depth is about 3 feet at mean low water.

To satisfy the needs of the present commerce a channel is required 8 feet deep at mean low water as far as the Salamander Dock, the upper dock on the creek.

The creek is essentially a tidal stream, with mud banks on either side of the channel, and there is little power available to maintain any improvement effected. Maintenance by frequent redredging will be necessary.

A width of 75 feet, with sides sloping to a bottom width of 50 feet, is as large a cross section as it would seem advisable to make and maintain. This project will require dredging, at least for partial widths, for the entire distance within the limits of the improvement, about 10,000 feet. Dredging under previous contracts in Woodbridge Creek varied in rate from 20 to 61 cents per cubic yard, scow measurement. The disposal of the material at sea requires the use of large scows, which can not be operated in Woodbridge Creek at all stages of the tide, owing to the shoalness along the sides and the sharp turns in the line of the creek. The banks are not firm enough to carry the weight of dredged material. Pumping plants, suitable for delivering material back a safe distance from the banks, assuming that the land could be obtained for this purpose, are seldom available in this locality.

To meet prevailing conditions and prices the cost of dredging in Woodbridge Creek is estimated at 25 cents per cubic yard, scow measurement. An estimate of the cost of the improvement proposed is as follows:

For obtaining a channel 8 feet deep at mean low water from the Arthur Kill to the Salamander Dock, having a width of 75 feet, sloping to a width of 50 feet at the bottom, by dredging:	
128,000 cubic yards of material, scow measurement, at 25 cents	$32,000
Engineering and contingencies	3,000
Total	35,000
Estimate for maintenance, dredging required annually, 12,000 cubic yards of material, scow measurement, at 25 cents	3,000

Respectfully submitted.

C. S. KELSEY,
Assistant Engineer.

Col. J. W. BARLOW,
Corps of Engineers, U. S. A.

APPENDIX I.

IMPROVEMENT OF DELAWARE RIVER AND BAY AND OF CERTAIN WATERS TRIBUTARY THERETO, NEW JERSEY, PENNSYLVANIA, AND DELAWARE, AND OF RIVERS AND HARBORS IN SOUTHERN NEW JERSEY.

REPORT OF LIEUT. COL. C. W. RAYMOND, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Delaware River, New Jersey and Pennsylvania.
2. Harbor between Philadelphia, Pennsylvania, and Camden, New Jersey.
3. Schuylkill River, Pennsylvania.
4. Ice Harbor at Marcus Hook, Pennsylvania.
5. Construction of iron pier in Delaware Bay, near Lewes, Delaware.
6. Delaware Breakwater, Delaware.
7. Construction of Harbor of Refuge, Delaware Bay, Delaware.
8. Rancocas River, New Jersey.
9. Cooper Creek, New Jersey.
10. Mantua Creek, New Jersey.
11. Alloway Creek, New Jersey.
12. Goshen Creek, New Jersey.
13. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEYS.

14. Raccoon Creek, New Jersey.
15. Oldmans Creek, New Jersey.
16. Maurice River, New Jersey.
17. Tuckerton Creek, New Jersey.
18. Delaware River below Philadelphia, Pennsylvania.

United States Engineer Office,
Philadelphia, Pa., July 19, 1900.

General: I have the honor to transmit herewith the annual reports for the works of river and harbor improvement in my charge for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

C. W. Raymond,
Lieut. Col., Corps of Engineers

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

I 1.

IMPROVEMENT OF DELAWARE RIVER, NEW JERSEY AND PENNSYLVANIA.

An account of this improvement is contained in the Annual Reports of the Chief of Engineers for 1896, page 877; 1897, page 1192; 1898, page 1075; and 1899, page 1317. Expenditures during the past fiscal year have been applied to the following operations:

1. Examinations at Perriwig Bar, Kinkora Bar, Five-mile Bar, Mifflin Bar, Schooner Ledge and bar between it and Marcus Hook,

Holly Oak Reach, Cherry Island Flats, shoal below Christiana River, shoal between Pennsville and Bulkhead Bar, Bulkhead Bar, off Salem Cove, Dan Baker Shoal, and Duck Creek Flats.

2. Surveys of the channel from Woodland Beach to Reedy Island, of the obstructions in the channel near the head of Pea Patch Island, from Chester Island to Tinicum Island, from League Island to Greenwich Point, and south and east of Petty Island.

3. Removal of rock from the channel opposite Petty Island.

4. Improvement and survey of Dan Baker Shoal (subsection B, section 1).[1]

These operations will be described in the above order. The localities referred to and previous operations thereat are described in the Annual Report of the Chief of Engineers for 1896, pages 1076–1079, and 1899, pages 1317–1322.

1. EXAMINATIONS.

Perriwig Bar.—A recent examination shows that the channel through this bar has a minimum depth of 6 feet at mean low water.

Kinkora Bar.—A recent examination shows that the channel through this bar has a minimum depth of 7½ feet at mean low water.

Five-mile Bar.—A recent examination shows that the channel through this bar has a depth of 26 feet at mean low water. This bar was dredged in connection with the improvement of Philadelphia Harbor.

Mifflin Bar (*section 8*).—A recent examination shows that the channel through this bar has a minimum depth of 25½ feet at mean low water. This bar was dredged in 1898 and 1899 by the city of Philadelphia.

Schooner Ledge (*section 6*) *including bar between it and Marcus Hook.*—A recent examination shows that the channel through these bars has a minimum depth of 25½ feet at mean low water.

Holly Oak Reach (*sections 4–5*).—A recent examination shows that the channel through this bar has a minimum depth of 26 feet at mean low water.

Cherry Island Flats (*section 4*).—A recent examination shows that the channel through this bar has a minimum depth of 21.3 feet at mean low water.

Below Christiana River (*section 4*).—A recent examination shows that the channel through this bar has a minimum depth of 26 feet at mean low water.

Between Pennsville and Bulkhead Bar (*section 3*).—A recent examination shows that the channel through this bar has a minimum depth of 26 feet at mean low water.

Bulkhead Bar (*section 3*).—A recent examination shows that the channel through this bar has a minimum depth of 25½ feet at mean low water.

Off Salem Cove (*section 2*).—A recent examination shows that the channel through this bar has a minimum depth of 24 feet at mean low water.

Dan Baker Shoal (*section 1*).—A recent examination shows that the dredged channel through this bar has a minimum depth of 16½ feet at mean low water.

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[1] The sections referred to herein are shown on the map accompanying the report of the Chief of Engineers, dated January 5, 1898, and printed in House Doc. No. 219, Fifty-fifth Congress, second session.

Duck Creek Flats (*section 1*).—A recent examination shows that the channel through this shoal has a minimum depth of 22.3 feet at mean low water.

2. SURVEYS.

From Woodland Beach to Reedy Island.—This survey was made in accordance with the instructions of the Board of Officers of the Corps of Engineers, constituted by Special Orders No. 16, Headquarters, Corps of Engineers, United States Army, dated March 20, 1899, to consider and report upon the project for obtaining a channel 600 feet wide and 30 feet deep from Christian street, Philadelphia, to deep water in Delaware Bay. The object of the survey was to determine the changes which had taken place in the lower river in order that the project might be formulated accordingly.

Obstructions near the head of Pea Patch Island.—This survey was made in April, 1900, in order to determine the nature and extent of the obstructions in this locality which were reported as being struck by the steamer *Brisgavia*, while outward bound on February 27, 1900.

From Chester Island to Tinicum Island.—This survey was made in January, 1900, to determine the extent of the shoal which projects into the channel at this locality.

From League Island to Greenwich Point.—This survey was made to determine shore lines and locate triangulation stations as a basis for future hydrographic surveys of the river at this locality.

South and east of Petty Island.—This survey was commenced in January, 1900, to determine the changes which have occurred in the channel back of Petty Island, and to determine the changes in the water front of the upper end of Philadelphia Harbor. It is not yet completed.

3. REMOVAL OF ROCK OPPOSITE PETTY ISLAND.

A project for the expenditure of $125,000 of the appropriation made in the river and harbor act of March 3, 1899, to be used for removing rock from the channel of the river opposite Petty Island (above Christian street, Philadelphia), was submitted on June 6, 1899, and approved June 14, 1899.

Under date of August 11, 1899, a contract was entered into with P. Sanford Ross, Incorporated, of Jersey City, N. J., for the removal of about 6,499 cubic yards of rock in the channel of the river at this locality, together with the overlying and adjacent material, so as to form a clear channel with a least depth of 26 feet at mean low water. Work under this contract was commenced on October 7, 1899, and is now in progress. On June 30, 1900, 832 cubic yards of rock and overlying material, scow measurement, had been removed.

4. IMPROVEMENT AND SURVEY OF DAN BAKER SHOAL (SUBSECTION B, SECTION 1).

A project for the expenditure of funds available for the improvement of the river between Christian street and deep water in Delaware Bay was submitted on September 25, 1899, and approved September 29, 1899. This project is in accordance with the report of the Board of Engineers dated September 8, 1899, and approved by the Secretary of

War, September 20, 1899, which provides for a channel 600 feet wide and 30 feet deep from Christian street, Philadelphia, to deep water in Delaware Bay, and further provides for the application of the expenditure now authorized by law to the excavation of the channel through subsection B of section 1 to a full depth of 30 feet at mean low water, with a width as great as can be formed with the funds available, not exceeding 600 feet, and to the construction of so much of the bulkhead required for the formation of the proposed island as is necessary to form a basin for the deposit of the material so excavated.

Under date of January 27, 1900, a contract was entered into with the Virginia Dredging Company, of Richmond, Va., for the removal of about 2,323,000 cubic yards of material to form a channel through the shoal in subsection B, section 1 (near Reedy Island), to a depth of 30 feet at mean low water over a length of 20,500 feet, and to a width as great as can be formed with available funds, not exceeding 600 feet, together with the construction of about 11,700 linear feet of bulkhead to form a partly inclosed basin for the reception of dredged material. This contract is in accordance with the above-mentioned project.

Work under this contract was commenced on April 4, 1900, by the driving of piles for the construction of the proposed bulkhead. On June 30, 1900, 2,500 linear feet of bulkhead had been partly constructed. The work of dredging will commence when 5,000 linear feet of bulkhead are entirely completed.

The sundry civil act approved June 6, 1900, contained an appropriation of $270,500 for continuing this work.

MISCELLANEOUS.

During the fiscal year ending June 30, 1898, a survey of the river, made in accordance with the provisions of the river and harbor act of June 3, 1896, was completed from Philadelphia to deep water in the bay, and a project for further improvement submitted January 5, 1898.

The project provides for the formation by dredging, and rock removal at Schooner Ledge, of a channel 600 feet wide and 30 feet deep at mean low water along the axis of the main ship channel from a point opposite Christian street, Philadelphia, to deep water in the bay, and for rock removal at Petty Island. The total cost of the work is estimated at $5,935,000, on the basis of its execution under a continuous contract within six years after commencement.

The river and harbor act of March 3, 1899, provided for continuing the improvement of this river as follows:

> Improving Delaware River from Trenton to its mouth, Pennsylvania and New Jersey: Continuing improvement, three hundred thousand dollars, of which the Secretary of War may use so much as may, in his opinion, be required between Trenton and Christian street in Philadelphia, and the balance shall be available for obtaining a channel six hundred feet wide and thirty feet deep from said Christian street to deep water in Delaware Bay, in accordance with the report printed in House Document Number Two hundred and nineteen, Fifty-fifth Congress, second session, or such modified project as shall hereafter be recommended by a board of engineers and approved by the Secretary of War: *Provided*, That the total cost of the work shall not be increased thereby: *And provided further*, That the Secretary of War may enter into contract or contracts for such materials and work as may be required for prosecuting such improvement, not to exceed in the aggregate five hundred thousand dollars, to be paid for as appropriations may from time to time be made by law. The Secretary of War is hereby authorized to appoint a board of three engineers to make a further examination of the project and report such modification of the same as may be deemed desirable, with an estimate of the cost, the expense of such examination to be paid from the appropriation herein made.

A Board of Officers of the Corps of Engineers was constituted by Special Orders, No. 16, Headquarters, Corps of Engineers, United States Army, dated March 20, 1899, to consider and report on the project for obtaining a channel 600 feet wide and 30 feet deep from Christian street, Philadelphia, to deep water in Delaware Bay, in accordance with the above provision of the river and harbor act of March 3, 1899. The Board held its first meeting in Philadelphia on April 10, 1899, and after making an examination of the river directed that a further survey be made of that portion of the channel between deep water above Dan Baker Shoal and deep water in Delaware Bay.

Upon the completion of this survey the Board reassembled at Philadelphia on September 7, 1899, and after fully considering the new survey and information submitted by the district engineer, unanimously adopted a report, which was submitted on September 8, 1899, and approved by the Secretary of War on September 20, 1899. The Board adjourned the same day. A copy of this report is appended hereto.

The project approved September 29, 1899, also provided for the reservation of $18,400 from the appropriation of June 3, 1896, for the repair and maintenance of dikes. No expenditure has been made during the past fiscal year from this allotment.

The Delaware River is tributary to the following collection districts: Trenton, Philadelphia, Wilmington, and Bridgeton. The amount of revenue collected in these districts during the year ending December 31, 1899, was $20,777,735.38.

Money statement.

July 1, 1899, balance unexpended		$317,274.83
Amount appropriated by sundry civil act approved June 6, 1900		270,500.00
		587,774.83
June 30, 1900, amount expended during fiscal year		31,408.19
July 1, 1900, balance unexpended		556,366.64
July 1, 1900, outstanding liabilities	$150.00	
July 1, 1900, amount covered by uncompleted contracts	525,198.15	
		525,348.15
July 1, 1900, balance available		31,018.49
Amount (estimated) required for completion of existing project		5,371,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		[1] 1,000,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Act of—		Act of—	
July 4, 1836	$15,000	July 5, 1884	$200,000
June 10, 1872	10,000	August 5, 1886	210,000
March 3, 1873	115,000	August 11, 1888	250,000
June 23, 1874	60,000	September 19, 1890	240,000
March 3, 1875	30,000	July 13, 1892	50,000
August 14, 1876	40,000	August 18, 1894	170,000
June 18, 1878	110,000	June 3, 1896	500,000
March 3, 1879	201,000	March 3, 1899	300,000
June 14, 1880	235,000	June 6, 1900	270,500
March 3, 1881	250,000		
August 2, 1882	286,000	Total	3,542,500

Total amount appropriated on present project to June 30, 1900 .... $438,500.00

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[1] Of this amount $61,500 is required for the completion of the work provided for under the existing continuing contract authorized by the river and harbor act of March 3, 1899, and the remainder is to be applied to further work under the general project.

EXPENDITURES.

Total to June 30, 1900	$2,986,133.36
Total on present project to June 30, 1900	18,455.88

Abstract of proposals for removal of rock in Delaware River, opposite Petty Island, opened July 31, 1899, by Lieut. Col. C. W. Raymond, Corps of Engineers.

[Approximate quantity of rock to be removed, 6,499 cubic yards, measured in excavation.]

No.	Name and address of bidder.	Per cubic yard.	Amount.
1	American Dredging Co., Philadelphia, Pa	$7.45	$48,417.55
2	International Wrecking, Salvage, and Submarine Co., Atlantic City, N. J.	9.50	61,740.50
3	John L. Mills, Camden, N. J	11.75	76,363.25
4	H. T. Dunbar & Co., Buffalo, N. Y	16.47	107,038.53
5	Charles W. Johnston, Lewes, Del	9.33	60,635.67
6	George A. Rogers, Plattsburg, N. Y	13.23	85,981.77
7	P. Sanford Ross, Incorporated, Jersey City, N. J	6.85	44,518.15

Contract (dated August 11, 1899) entered into with P. Sanford Ross, Incorporated.
In progress.

Abstract of proposals for dredging in the Delaware River near Reedy Island, and constructing a bulkhead for retaining dredged material, opened November 20, 1899, by Lieut. Spencer Cosby, Corps of Engineers, in the absence of Lieut. Col. C. W. Raymond, Corps of Engineers.

No.	Name and address of bidder.	Approximate quantities.										Total amount of bid.
		Excavation and removal of material.			Piles, timber, and iron.							
		From channel of river, 2,985,000 cubic yards (per cubic yard).	For bulkhead and retaining bank, 286,000 cubic yards (per cubic yard).	Total.	Oak piling, 126,000 linear feet (per linear foot).	Yellow-pine piling, 149,000 linear feet (per linear foot).	Yellow-pine timber, 2,555,000 feet B. M. (per 1,000 feet B. M.).	Hemlock timber, 469,000 feet B. M. (per 1,000 feet B. M.).	Tie-rods, screw bolts, nuts, and washers, 618,000 pounds (per pound).	Spikes, 80,000 pounds (per pound).	Total.	
		Cts.	*Cts.*		*Cts.*	*Cts.*			*Cts.*	*Cts.*		
1	Virginia Dredging Co., Richmond, Va	6	5½	$194,830	24	15	$34.00	$25.00	4¼	3¾	$180,450.00	$375,280.00
2	Morris & Cummings Dredging Co., New York, N. Y	7 7/10	7	249,865	19¾	15½	32.99	28.75	3 89/100	3 49/100	172,585.40	422,450.40
3	American Dredging Co., Philadelphia, Pa	6	5	193,400	23½	16	41.00	34.85	4¼	4½	208,970.15	397,370.15

Contract (dated January 27, 1900) entered into with the Virginia Dredging Company.

In progress.

ABSTRACT OF CONTRACTS IN FORCE, WITH NAMES OF CONTRACTORS, DATE OF APPROVAL, OF BEGINNING WORK, AND OF EXPIRATION.

1. With P. Sanford Ross, Incorporated, of Jersey City, N. J., dated August 11, 1899, and approved August 26, 1899, for excavation and removal of rock and overlying material in the Delaware River opposite the lower end of Petty Island. Work to be commenced on or before October 27, 1899, and completed on or before August 29, 1901.

2. With the Virginia Dredging Company, of Richmond, Va., dated January 27, 1900, and approved February 23, 1900, for dredging in the Delaware River near Reedy Island and constructing bulkhead for retaining dredged material. Work to be commenced between March 1 and April 15, 1900, and completed on or before October 31, 1901.

COMMERCIAL STATISTICS.

The following statement concerning the foreign commerce of the Delaware River, for the years ending December 31, 1898 and 1899, are compiled from reports of the Board of Trade, the Commercial Exchange, and the Maritime Exchange of the city of Philadelphia.

Articles.	1898.	1899.
IMPORTS.	*Tons.*	*Tons.*
Asphalt and asphalt blocks	3,471	11,739
Burlap	11,510	....
Cement	27,085	23,006
Chalk	34,365	27,865
Clay	16,163	17,373
Coal	537	963
Coal tar, and pitch of	1,282	691
Cork and cork wood	646	485
Cotton and cotton fabrics	2,277	3,504
Drugs and chemicals	72,306	69,127
Earthenware, china, and stoneware	174	162
Fertilizers	10,492	12,634
Fruits	9,707	21,632
Glass, and manufactures of	882	875
Glue and glue stock	1,094	1,786
Groceries and provisions	4,794	6,004
Hair, and manufactures of	511	1,167
Hemp, jute, flax, and their fabrics	105,300	28,978
Hides and skins	5,769	9,414
Iron, manufactures of	7,050	8,054
Iron ore	112,608	421,187
Iron, pig	6,044	13,617
Iron, scrap	164	732
Leather, and manufactures of	192	194
Live stock and fowls	117	19
Mineral water	330	716
Molasses	5,602	16,528
Oil	1,535	1,222
Ores, metals, and manufactures of	1,119	1,281
Plants and seeds	2,747	4,099
Plaster of paris	17,516	15,108
Rags	1,183	2,280
Salt	10,882	5,859
Silk, and manufactures of	106	264
Stone, and manufactures of	2,933	2,091
Sugar	364,931	422,828
Sulphur, crude	6,955	9,861
Sulphur, ore	46,341	79,991
Tin	17,649	8,893
Tobacco	144	384
Wines and liquors	1,012	1,567
Wood pulp, paper, and manufactures of	19,867	1,431
Wood, and manufactures of	2,702	3,916
Wool, and wool fabrics	5,103	6,560
Miscellaneous	5,900	4,853
Total	949,097	1,270,440

Articles.	1898.	1899.
EXPORTS.	*Tons.*	*Tons.*
Beef, pork, and products	55,210	54,500
Bricks	395	3,743
Bran, middlings, and mill feed	5,360	20,190
Cars and locomotives	7,498	4,605
Coal	492,403	485,604
Corn and corn meal	841,148	827,663
Cotton and cotton fabrics	6,610	1,629
Drugs and chemicals	4,577	6,164
Fertilizers	352	956
Flour	171,129	222,775
Fruit	676	278
Glucose	11,613	8,801
Glue and glue stock	69	57
Groceries and provisions	9,629	11,048
Gunpowder and explosives	378	262
Hay	2,289	848
Hides, leather, and manufactures of	904	1,367
Iron, manufactured	15,055	26,788
Iron ore	899	....
Iron, pig	2,038	205
Iron, scrap	100	68
Live stock	4,560	5,062
Metals, and manufactures of	3,939	5,549
Molasses	12,433	22,446
Oats and oatmeal	95,231	126,671
Oil cake	48,348	62,818
Oils, lubricating	48,801	72,854
Oils, other	3,080	739
Paraffin	13,682	14,022
Petroleum, crude and refined	873,468	851,145
Residuum	24,568	21,175
Rye	40,894	17,351
Seeds	1,685	3,249
Soap, tallow, and grease	8,239	4,079
Stone, manufactured	8,572	8,903
Tobacco	2,381	5,232
Wheat	169,818	120,418
Wines and liquors	22	12
Wood pulp, paper, and manufactures of	1,316	792
Wood, and manufactures of	27,206	34,778
Miscellaneous	7,435	15,274
Total	3,019,005	3,069,570

Passengers arriving from and departing for foreign countries.

	1898.	1899.
Arriving	11,413	26,981
Departing	5,294	5,926
Total	16,707	32,907

Comparative statement of tons and values of exports, imports, and revenue collected.

Year.	Exports.		Imports.		Revenue.
	Tons.	Value.	Tons.	Value.	
1892	2,359,155	$60,274,024	1,429,636	$63,277,781	$10,886,475
1893	1,816,297	43,416,955	1,154,814	58,870,186	9,899,284
1894	1,861,578	37,441,000	1,164,572	51,553,704	8,456,183
1895	1,738,913	36,745,119	1,355,456	47,271,435	13,526,966
1896	1,875,081	42,431,100	1,151,722	39,807,278	12,657,803
1897	2,599,952	51,760,616	1,182,807	27,921,738	14,057,074
1898	3,019,005	59,392,047	949,097	37,516,707	19,818,783
1899	3,069,570	67,044,250	1,270,440	48,241,016	20,777,735

Foreign entrances and clearances.

Class.	Entered from foreign ports.				Cleared for foreign ports.				Total.	
	With cargoes.		In ballast.		With cargoes.		In ballast.			
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
American steam vessels	29	37,075	5	4,127	16	20,846	18	24,498	68	86,546
American sail vessels	90	52,629	....	....	71	38,363	3	1,198	164	92,190
Foreign steam vessels	557	996,310	290	558,961	768	1,486,791	93	71,691	1,708	3,113,753
Foreign sail vessels	78	77,410	22	27,363	90	95,246	6	2,597	196	202,616
Total	754	1,163,424	317	590,451	945	1,641,246	120	99,984	2,136	3,495,105

The following statement concerning the domestic and coastwise commerce of the Delaware River for the years ending December 31, 1898 and 1899, has been compiled from returns made by shippers, consignees, and carriers:

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Asphalt	....	....	1,969	$69,915
Brick and terra cotta	36,036	$167,895	53,647	144,984
Cement and plaster	31,408	131,013	27,015	122,298
Chemicals	185,073	3,017,085	155,603	3,150,820
Coal	900,230	2,645,257	527,909	1,654,189
Cotton	4,347	437,444	8,127	1,148,050
Fertilizers	68,242	1,063,455	236,497	1,687,131
Grain	19,103	427,774	24,213	513,026
Hay	14,326	83,486	10,108	68,063
Ice	334,010	664,970	240,939	461,888
Iron, manufactured	27,016	1,420,489	116,602	2,932,158
Iron ore	....	....	7,399	59,620
Iron, pig	303,858	3,371,506	179,925	2,875,095
Iron, scrap	5,483	53,126	11,865	248,584
Lumber	857,619	4,725,923	502,549	9,901,674
Manure	....	....	22,572	22,634
Oysters and fish	20,700	741,470	21,160	802,520
Petroleum and products	74,531	857,416	149,406	2,669,180
Produce and fruit	29,488	549,758	60,736	1,172,416
Railroad ties	145,402	583,347	149,342	828,522
Sand	1,083,933	681,716	787,018	542,947
Stone, building	48,806	226,482	451,456	952,042
Stone, paving	169,327	525,592	125,926	205,796
Wood, cord	34,246	111,567	42,411	178,871
Miscellaneous	1,306,362	318,657,088	2,176,985	618,915,305
Total	5,699,546	341,143,859	6,091,379	651,322,728

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
DEPARTING.				
Asphalt			1,969	$68,915
Brick	7,720	$37,300	32,107	118,969
Cement and plaster	5,300	35,000	3,709	22,638
Chemicals	93,263	2,316,005	81,792	2,085,405
Coal	5,133,750	15,281,522	7,322,026	25,453,530
Cotton	8,631	1,083,660	8,477	1,407,490
Fertilizers	71,785	1,309,881	211,435	1,856,433
Grain	6,371	99,855	9,271	195,831
Hay			6,198	88,573
Ice	580	1,160	85,157	150,314
Iron, manufactured	144,231	3,798,512	128,681	5,438,186
Iron ore			7,399	59,620
Iron, pig	29,040	328,040	166,706	2,522,825
Iron, scrap	1,000	10,000	663	9,945
Lumber	87,640	234,262	42,019	802,215
Manure	130,388	177,163	126,782	183,021
Oysters and fish	154,450	1,152,525	154,440	1,152,725
Petroleum and products	150,771	2,378,964	188,384	3,697,533
Produce	30,780	767,600	1,200	78,400
Sand	131,176	113,781	901,960	542,577
Stone, building	417,154	492,242	17,314	82,219
Stone, paving			12,975	47,450
Sugar			5,200	855,000
Wood, cord	1,350	5,050	7,381	41,315
Miscellaneous	1,298,120	290,225,229	1,965,598	499,060,529
Total	7,853,500	319,847,451	11,478,843	545,471,658

Passengers arriving at and departing from Philadelphia.

	1898.	1899.
Arriving	1,772,025	1,385,144
Departing	1,775,125	1,413,666
Total	3,547,150	2,798,810

Domestic and coastwise arrivals and departures in cargo.

Class.	1898.		1899.	
	Arrivals.	Departures.	Arrivals.	Departures.
Steamers	[a] 23,420	[a] 24,044	17,334	16,118
Sailing vessels	4,634	36,489	4,645	[b] 35,944
Canal boats and barges	30,059	29,744	[c] 30,416	[d] 44,064
Rafts	683	679	81	303
Total	58,796	90,956	52,476	96,429

[a] Excluding tugboats and ferryboats.

[b] Including 31,570 oyster boats.

[c] Including 14,606 railroad lighters.

[d] Including 13,564 railroad lighters.

SUMMARY.

Freight movement.

	1898.		1899.	
	Tons.	Value.	Tons.	Value.
Foreign:				
Arriving	949,097	$37,516,707	1,270,440	$48,241,016
Departing	3,019,005	59,392,047	3,069,570	67,044,250
Domestic:				
Arrriving	5,699,546	341,143,859	6,091,379	651,322,728
Departing	7,853,500	319,847,451	11,478,843	545,471,658
Total	17,521,148	757,900,064	21,910,232	1,312,079,652

Vessel movement.

	1898.	1899.
Steam vessels, foreign trade, arriving	851	881
Sailing vessels, foreign trade, arriving	232	190
Steam vessels, foreign trade, departing	837	895
Sailing vessels, foreign trade, departing	249	170
Steam vessels, domestic trade, arriving	23,420	17,334
Sailing vessels, domestic trade, arriving	4,634	4,645
Canal boats and barges, domestic trade, arriving	30,059	30,416
Rafts, domestic trade, arriving	683	81
Steam vessels, domestic trade, departing	24,044	16,118
Sailing vessels, domestic trade, departing	36,489	35,944
Canal boats and barges, domestic trade, departing	29,744	44,064
Rafts, domestic trade, departing	679	303
Total	151,921	151,041

I 2.

IMPROVEMENT OF HARBOR BETWEEN PHILADELPHIA, PA., AND CAMDEN, N. J.

An account of this improvement is contained in the Annual Reports of the Chief of Engineers for 1896, page 897; 1897, page 1205; 1898, page 1085; and 1899, page 1328.

A final report on the improvement was submitted June 15, 1899, and was printed in the Annual Report of the Chief of Engineers for 1899, page 1330.

During the past fiscal year no work has been done in connection with the improvement, and no further appropriation is required. The unexpended balance on July 1, 1899, pertaining to this work was $87.70; of this amount the sum of 46 cents was expended during the fiscal year, and the sum of $87.24 remains in the United States Treasury to the credit of the appropriation.

During the past fiscal year 5 piers, including 3 previously commenced, were extended fully to the new line, and permission was given by the board of port wardens for the extension of 6 others. Two piers are now under construction.

Up to June 30, 1900, 28 wharves between Allegheny avenue and Washington avenue, on the Philadelphia front, have been extended to the new pierhead line, and between Pearl and Mickle streets, Camden, 5 wharves have been similarly extended to the New Jersey pierhead line.

The city of Philadelphia has constructed a new bulkhead along the bulkhead line from Vine to South streets, which has permitted the widening of Delaware avenue at that locality to 150 feet. The work of widening Delaware avenue between Vine and Green streets, has been authorized, but no appropriations have yet been made for commencing this work.

Detailed information with reference to these subjects is given in a letter dated June 11, 1900, from Mr. Theo. C. Knauff, secretary of the board of harbor commissioners, which he has kindly prepared at my request. This letter and its accompanying papers are appended hereto.

The commercial statistics pertaining to this work are included in the statistics accompanying the report for the improvement of Delaware River.

This work lies in the collection district of Philadelphia, at which, as a port of entry, there was collected during the year ending December 31, 1899, revenue to the amount of $20,748,258.22.

The nearest fort and light-houses are, respectively, Fort Mifflin and Upper Horseshoe range lights.

Money statement.

July 1, 1899, balance unexpended	$87.70
June 30, 1900, amount expended during fiscal year	.46
July 1, 1900, balance unexpended	87.24

APPROPRIATIONS.

Act of—		Act of—	
August 11, 1888	$500,000	August 18, 1894	$250,000
September 19, 1890	200,000	March 2, 1895	850,000
March 3, 1891	300,000	June 11, 1896	600,000
August 5, 1892	41,000	June 4, 1897	694,000
March 3, 1893	500,000		
		Total	3,935,000

Total appropriations for part payment for land	$300,000
Total appropriations under project to June 30, 1900	3,635,000
	3,935,000

EXPENDITURES.

Total to June 30, 1900		$3,934,912.76
Under project, for dredging and removal of pile and timber revetment	$3,279,197.18	
For depositing and spreading material on League Island	355,715.58	
For part payment of land	300,000.00	
		3,934,912.76

LETTER FROM MR. THEO. C. KNAUFF, SECRETARY OF THE BOARD OF HARBOR COMMISSIONERS FOR THE CITY OF PHILADELPHIA, PA., WITH REFERENCE TO THE IMPROVEMENT BY THE CITY OF THE HARBOR OF PHILADELPHIA, BY MEANS OF THE WIDENING OF DELAWARE AVENUE, AND THE EXTENSION OF PIERS BY PRIVATE OWNERS, DURING THE FISCAL YEAR ENDING JUNE 30, 1900, WITH TWO INCLOSURES.

BOARD OF HARBOR COMMISSIONERS FOR THE CITY OF PHILADELPHIA,
Philadelphia, Pa., June 11, 1900.

SIR: I beg to acknowledge the receipt of your communication under date of May 16, in which you ask to be furnished with a concise statement of what has been accomplished by the city of Philadelphia since June 30, 1899, in the improvement of the Delaware and Schuylkill rivers and the harbor of Philadelphia.

Under the head of the further improvement by the city of the harbor of Philadelphia, and the reconstruction of the water front by means of the widening of Delaware avenue and the extension of piers, I would report as follows:

The work of widening Delaware avenue was practically completed in the fall of 1899, though all damages have not yet been adjusted by the courts.

Contract No. 7 has been in progress for the construction of a concrete bulkhead wall on the easterly side of Delaware avenue between Vine and South streets and the widening of the avenue to a least width of 150 feet. The limit of this contract was $475,000, of which there has been paid to date, from the Girard Estate fund, set aside for the purpose, $414,059.63. The final estimate is still pending.

The ordinance of April 13, 1896, authorized the widening and extension of city piers at Chestnut, Arch, Race, and Dock streets. The Dock street pier is now under the control of the Pennsylvania Railroad Company, which has obligated itself to construct a pier.

On March 2, 1899, a superstructure for the pier at foot of Chestnut street was authorized, with a limit of $90,000, which consists of an upper deck supported by steel columns and girders paved with granolithic paving on a corrugated iron floor, and the outer portion covered with a pavilion of copper. A footbridge across Delaware avenue is also included in the contract. This work was all completed in the fall of 1899, at a total cost $86,350.41.

Contract No. 13, which was for the purpose of completing a bulkhead on the site of the old Race street pier, and to remove the old pier preparatory to constructing the new, has been in force.

It includes the construction of a bulkhead and the dredging of Pier No. 10, north wharves. The limit of the contract is $20,000, and the amount paid to date is $9,038.08.

Contract No. 14, for the construction of the new Race street pier, with a limit of $69,000, has also been in force, and under it the piles for the new wooden pier have been driven for about one-third of the length to the new pierhead line. Payments have been made on account of $11,639.26.

A contract has been made, but not yet executed, for the paving, repaving, grading, filling, and draining of that portion of Delaware avenue between Vine and South streets not completed under Contract No. 7. The limit of this contract is $36,000.

A contract will be made for a superstructure with pavilion at Race street as soon as the substructure of the pier is completed.

The work of widening Delaware avenue from Vine to Green streets has been authorized, but no appropriations have yet been made.

There are balances of appropriations still available for the resetting of curb, the repairing of the footway on the westerly side of the avenue, and the placing of a permanent paving of Belgian blocks in the street with a concrete foundation, the present paving being temporary only.

For the details of these plans and contracts, and information as to the work of enlarging the piers owned by the city, I am indebted to Mr. George S. Webster, chief engineer and surveyor of the city of Philadelphia, in whose accompanying communication, marked "Inclosure A," they will be found in full.

The list of licenses granted during the year by the board of port wardens for pier extensions will be found in full in the accompanying letter from Mr. George F. Sproule, secretary of the board of port wardens, marked "Inclosure B."

Yours, truly,

THEO. C. KNAUFF, *Secretary.*

Lieut. Col. C. W. RAYMOND,
Corps of Engineers.

INCLOSURE A.

DEPARTMENT OF PUBLIC WORKS, BUREAU OF SURVEYS,
Philadelphia, Pa., May 29, 1900.

DEAR SIR: Replying to your request for a statement of progress of work carried on by the city of Philadelphia in the reconstruction of water front, Philadelphia Harbor, including the widening of Delaware avenue, I would report as follows:

The work of widening Delaware avenue, under the contracts entered into during the year 1897, was practically completed in the early fall of 1899.

All the damages for the widening of the avenue have not yet been adjusted, as several suits for damages are now pending in the courts.

The following contracts have been in progress:

Contract No. 7, comprising the construction of a bulkhead wall of concrete on the easterly side of Delaware avenue between Vine and South streets and the widening of the avenue from 50 feet to a least width of 150 feet on the easterly or river side.

Contractor for this work was D. J. McNichol. Date of contract, September 18, 1897. Limit of contract, $475,000. The work was authorized by ordinances of councils April 13, 1896, and November 27, 1896. There has been paid to date from the Girard Estate fund, set aside for this purpose, $414,059.63. Final estimate is pending. The ordinance of April 13, 1896, authorized the widening and extension of piers at the foot of Chestnut street, Arch street, Race street, and Dock street. The Pennsylvania Railroad Company obtained control of the Dock street property with an obligation to construct a pier.

Contracts for pier construction have been entered into by the city in addition to those completed prior to June 1, 1899, as follows:

Contract No. 12.—Superstructure for pier at the foot of Chestnut street. Contractors, Armstrong & Printzenhoff. Date of contract, March 2, 1899. Limit of contract, $90,000. Work consists of steel columns, supporting girders, which form the upper deck. The upper deck is paved with granolithic on a corrugated-iron floor.

Upon the outer portion of the upper deck is erected a pavilion of copper, which is intended for the free use of the public. The work includes the construction of a footbridge across Delaware avenue, with approaches on the north and south footways of Chestnut street. This work was completed in the fall of 1899, and final estimate paid November 2, 1899. Total cost, $86,350.41.

Contract No. 13.—Comprises the construction of a bulkhead and work appurtenant thereto on the easterly line of Delaware avenue, at the foot of Race street; also dredging out of pier No. 10, North Wharves. Contractor, Daniel J. McNichol. Date of contract, December 27, 1899. Limit of contract, $20,000. Amount paid to date $9,038.08.

This work was intended to complete a bulkhead on the site of the old Race street pier, and to remove the old pier preparatory to the construction of the new.

Contract No. 14.—For the construction of wooden pier at the foot of Race street, in the Delaware River, to the pierhead line. License was granted the city of Philadelphia for the construction of the pier in the new location July 13, 1899. Contract was entered into with Messrs. Armstrong & Printzenhoff, under date of November 8, 1899, for this construction. Limit of contract, $69,000. The piles for about one-third the length have been driven, and $11,639.26 has been paid on account.

Contract No. 15.—For paving, repaving, grading, filling, and draining incident to widening of Delaware avenue, between Vine and South streets. Contractor, Daniel J. McNichol. Limit of contract, $36,000.

This contract is intended to cover the paving of that portion of Delaware avenue, as widened, which was not completed under contract No. 7. The contract has not yet been executed.

As soon as the substructure of Race street pier has been completed, proposals will be received for the construction of a superstructure with an upper deck pavilion.

Councils have authorized the extension of the work of widening Delaware avenue between Vine and Green streets, but no money has been appropriated to defray the cost of the same.

With the balance of the money appropriated for the purpose of widening Delaware avenue and the construction of piers, it is intended to reset the curb, repave the footway on the westerly side of Delaware avenue, and place a permanent paving in the street consisting of belgian blocks upon a concrete foundation.

Yours, truly,

G. S. Webster, *Chief Engineer.*

Mr. Theo. C. Knauff,
Secretary Board of Harbor Commissioners.

Inclosure B.

Board of Port Wardens for the Port of Philadelphia, Pa.,
Philadelphia, Pa., May 22, 1900.

Dear Sir: In reply to your favor of the 17th instant, in which you ask for a list of licenses granted by the board of port wardens for the extension of piers from June 30, 1899, to the present time, I beg to submit the following:

July 13, 1899, city of Philadelphia, for pier at Race street.

October 2, 1899, the William Cramp & Sons Ship and Engine Building Company, for extension of piers 77, 78, and 79, North Wharves.

October 2, 1899, Terminal Land Company, for extension of pier 40, North Wharves.

November 6, 1899, Pennsylvania Railroad Company, for extension pier 48, South Wharves.

February 5, 1900, Terminal Land Company, to construct pier between Snyder avenue and Jackson street.

There have been several bulkhead extensions, but I presume you merely want the list of new piers.

Very truly, yours,

Geo. F. Sproule, *Secretary.*

Mr. Theo. C. Knauff,
Secretary Board of Harbor Commissioners.

I 3.

IMPROVEMENT OF SCHUYLKILL RIVER, PENNSYLVANIA.

An account of this improvement is contained in the Annual Report of the Chief of Engineers for 1896, page 915.

Work under the contract dated November 6, 1896, with the Virginia Dredging Company, of Richmond, Va., for dredging a channel across the bar at the river's mouth, was completed April 21, 1897. Under this contract 62,983 cubic yards of material, scow measurement, were dredged.

During the fiscal year ending June 30, 1898, under an informal agreement entered into January 28, 1898, with John L. Grim, of Philadelphia, Pa., the pile dike at the mouth of the river was raised by spiking two courses of 12-inch by 12-inch pine lumber to the top of the sheet piling along the front and end walls, a total distance of 1,734 feet, at a cost of $1,673.77, including inspection and superintendence.

In April and May, 1898, by purchase of materials and hire of labor in open market, the earthen dike at the same locality, which had become badly eroded, was repaired by restoring the bank to its original cross-section, and revetting the outer slope with stone for a distance of 410 feet, at a cost of $656.80, including inspection and superintendence.

During the fiscal year ending June 30, 1899, the filling of the pile dike was raised to the level of the face wall by the deposit of coarse gravel and bowlders, at a total cost of $813.72.

During the past fiscal year no work has been done in connection with this improvement, and no expenses have been incurred.

It is proposed to apply the available balance of $11,100 to the redredging of the channel at the mouth of the river. It is expected that this work will be commenced during the present season.

During the past five years the city of Philadelphia has been engaged in improving the channel of this river under authorities of the Secretary of War dated September 3, 1895, and May 14, 1896. This work was completed in December, 1899, available funds having become exhausted. Up to the close of the work 615,377 cubic yards of material had been removed from the channel and placed ashore.

Detailed information with reference to this subject is given in a letter dated June 11, 1900, from Mr. Theo. C. Knauff, secretary of the board of harbor commissioners, which he has kindly prepared at my request. This letter is appended hereto.

These works have resulted in the formation of a channel with a low-water depth of from 20 to 24 feet and a width of about 125 feet through the bar at the mouth of the river, a channel with a depth of 22 feet at mean low water and a width of 250 feet from Penrose Ferry Bridge to Fifty-eighth street, near Gibson Point, except at Yankee Point, where the width is 300 feet. From a point opposite Fifty-eighth street the channel has a width of from 150 feet to 200 feet and a mean low-water depth of 20 feet to a point about 500 feet above Harrison's wharf.

This improvement can be completed in accordance with the adopted project with funds now available.

During the fiscal year ending June 30, 1898, a survey of the river, made in accordance with the provisions of the river and harbor act of June 3, 1896, was completed from the mouth to Walnut Street Bridge, a distance of 7.39 miles, and a project for further improvement was submitted on March 5, 1898. The project provides for the formation, by dredging, of a channel with a depth of 26 feet at mean low water, and a bottom width of 400 feet from outside the bar to Penrose Ferry Bridge (1½ miles), and thence a bottom width of 390 to 400 feet to Gibson Point (about 3 miles); from Gibson Point to Walnut Street Bridge (about 2.9 miles), for a channel 22 feet deep at mean low water and a bottom width varying from 320 to 400 feet. The total cost of the work was estimated at $3,153,000.

This work lies in the collection district of Philadelphia, at which, as a port of entry, there was collected during the year ending December 31, 1899, revenue to the amount of $20,748,258.22. The nearest fort and light-houses are, respectively, Fort Mifflin and Schuylkill River range lights.

Money statement.

July 1, 1899, balance unexpended	$11,100.00
July 1, 1900, balance unexpended	11,100.00

APPROPRIATIONS.

Act of—		Act of—	
June 11, 1870	$15,000	August 2, 1882	$25,000
March 3, 1871	10,000	July 5, 1884	25,000
June 10, 1872	40,000	August 5, 1886	18,750
March 3, 1873	40,000	August 11, 1888	25,000
June 23, 1874	20,000	September 19, 1890	45,000
March 3, 1875	20,000	July 13, 1892	46,250
August 14, 1876	20,000	August 18, 1894	20,000
June 18, 1878	30,000	June 3, 1896	20,000
March 3, 1879	25,000		
June 14, 1880	40,000	Total	525,000
March 3, 1881	40,000		

EXPENDITURES.

Total to June 30, 1900	$513,900

COMMERCIAL STATISTICS.

The following statement of the foreign and domestic commerce of the Schuylkill River for the years ending December 31, 1898 and 1899, has been compiled from returns made by shippers, consignees, and carriers:

Vessel movement.

Class.	1898.		1899.	
	Arrivals.	Departures.	Arrivals.	Departures.
Steamers	227	669	148	555
Sailing vessels	301	268	314	172
Canal boats and barges	3,643	2,213	4,858	3,166
Total	4,171	3,150	5,320	3,893

Freight movement.

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Asphalt	3,633	$57,155	13,128	$341,280
Chemicals	12,696	66,289	35,156	348,869
Clay	1,145	1,923	....	....
Coal	396,073	1,148,039	459,233	1,599,677
Coal tar	15,964	319,280	....	....
Hay	1,540	9,242	1,387	8,325
Hemp and jute	....	....	4,407	264,420
Ice	96,989	201,028	84,957	149,914
Iron, manufactured	1,704	37,172	275	9,866
Iron ore	80,953	890,483	127,300	1,018,400
Licorice root	....	....	3,456	414,720
Lumber	8,049	76,708	3,724	102,209
Stone, building	24,841	209,894	17,864	111,914
Stone, paving	2,000	7,000	23,497	44,341
Sand	306,362	173,088	564,088	298,070
Wood, cord	21,441	70,329	13,250	71,643
Miscellaneous	19,694	3,571,956	88,412	1,921,921
Total	992,584	6,839,586	1,390,134	6,705,569
DEPARTING.				
Asphalt	656	22,960	1,969	68,915
Chemicals	1,117	28,932	41,624	433,012
Coal	159,736	394,447	122,485	384,355
Flour and meal	....	....	16,957	1,695,700
Grain	665,700	11,000,000	578,500	8,500,000
Iron, manufactured	6,479	97,318	5,478	324,525
Manure	41,418	42,418	50,272	61,234
Oil cake	14,684	353,416	5,205	135,830
Petroleum and products	2,244,053	23,617,047	1,136,616	17,109,652
Miscellaneous	31,002	4,492,521	134,582	4,205,399
Total	3,164,845	40,049,059	2,093,688	32,918,122

LETTER FROM MR. THEO. C. KNAUFF, SECRETARY OF THE BOARD OF HARBOR COMMISSIONERS FOR THE CITY OF PHILADELPHIA, PA., WITH REFERENCE TO THE PROGRESS MADE BY THE CITY OF PHILADELPHIA IN THE WORK OF IMPROVING SCHUYLKILL RIVER, PENNSYLVANIA, DURING THE FISCAL YEAR ENDING JUNE 30, 1900, WITH ONE INCLOSURE.

BOARD OF HARBOR COMMISSIONERS FOR THE CITY OF PHILADELPHIA,
Philadelphia, June 11, 1900.

SIR: I beg to acknowledge the receipt of your communication under date of May 16, 1900, in which you ask to be furnished with a concise statement of what has been accomplished by the city of Philadelphia since June 30, 1899, in the improvement of the Delaware and Schuylkill rivers and the harbor of Philadelphia.

Under the head of the improvement of the Schuylkill River, I would report that there was only one contract, No. 8, in force during the year. This contract, which was dated March 7, 1899, was for work from a point about one-third of a mile below Fifty-eighth street, where contract No. 7 ended to Fifty-eighth street, and from a point south of the Baltimore and Philadelphia Railroad Bridge toward Walnut street. The limit of the contract was $45,000.

Under this contract 168,258 cubic yards of material other than rock, 1,170 cubic yards of rock, and 67 cubic yards of wreckage were removed and placed above high-water mark.

By means of this contract there is now a channel 1,800 feet long, 250 feet wide, and 22 feet deep at mean low water from a point one-third of a mile below Fifty-eighth street to Fifty-eighth street.

A small rock shoal opposite Gibson Point wharf has been removed to 20 feet below mean low water; and there is a channel 5,600 feet long, from 150 to 200 feet wide, and 20 feet in depth below mean low water from a point below the Baltimore and Philadelphia Railroad Bridge to a point 500 feet above Harrison's wharf.

The total results of work done by the city on the Schuylkill River under appropriations amounting to $220,000 were:

A continuous channel 250 feet wide, 22 feet below mean low water for a distance of 3 miles from Penrose Ferry Bridge to Fifty-eighth street, and a continuous channel

150 to 200 feet in width, 20 feet below mean low water, for 1.7 miles from Fifty-eighth street to a point 500 feet above Harrison's wharf.

Complete record plans have been furnished your office.

For the statement of the details of these contracts, and of the work done under them, I am indebted to Mr. George S. Webster, chief engineer and surveyor of the city of Philadelphia, a copy of whose communication, marked Inclosure C, is herewith inclosed.

Yours, truly,

THEO. C. KNAUFF, *Secretary.*

Lieut. Col. C. W. RAYMOND,
Corps of Engineers.

INCLOSURE C.

DEPARTMENT OF PUBLIC WORKS, BUREAU OF SURVEYS,
Philadelphia, May 29, 1900.

DEAR SIR: Replying to your letter requesting information upon the improvement of the channel of the Schuylkill River being carried on by the city of Philadelphia, I beg to state that the only contract in force and under execution during the year ending June 1, 1900 (with the exception of a final estimate of $42,447.11 paid June 21, 1899, closing up contract No. 4), is that comprised under contract No. 8.

Contract No. 8.—Dredging in Schuylkill River from a point about one-third of a mile below Fifty-eighth street, terminus of contract No. 7, to Fifty-eighth street, and from a point south of the Baltimore and Philadelphia Railroad Bridge toward Walnut street.

Authorized December 31, 1898; contractor, The American Dredging Company; date of contract, March 7, 1899; limit of contract, $45,000.

There was removed and placed beyond high-water mark under this contract 168,258 cubic yards of material other than rock, 1,170 cubic yards of ledge rock, and 67 cubic yards of wreckage. Final estimate was paid on February 5, 1900, amounting to $45,000.

Work upon this contract resulted as follows:

1. In the formation of a channel from a point one-third of a mile below Fifty-eighth street to Fifty-eighth street, 1,800 feet in length, 250 feet in width, and 22 feet in depth below mean low water.
2. In the removal of a small rock shoal opposite Gibson Point wharf to a depth of 20 feet below mean low water.
3. Formation of a channel from a point south of Baltimore and Philadelphia Railroad Bridge to a point 500 feet above Harrison's wharf, varying from 150 to 200 feet in width, 5,600 feet in length, and 20 feet in depth below mean low water.

The work developed the existence of a large rock shoal beginning about 170 feet above Harrison's wharf and extending a considerable distance above the limit of dredging done by the city.

The summary of the results accomplished on the Schuylkill River with $220,000 in all appropriated by the city for this purpose are as follows:

The work embraced under contracts 2, 3, 4, 7, and 8 resulted in the formation of a continuous channel 250 feet wide, dredged to a depth of 22 feet below mean low water from Penrose Ferry Bridge to Fifty-eighth street, a distance of 3 miles; and in the formation of a continuous channel 150 feet to 200 feet in width, dredged to a clear depth of 20 feet below mean low water from Fifty-eighth street to a point 500 feet above Harrison's wharf, a distance of 1.7 miles. The materials removed consisted of mud, rough gravel, bowlders, a considerable quantity of ledge rock, and wreckage.

A complete set of record plans have been furnished the Engineer Officer of the War Department, inspector of the Fourth Light-House district, maritime exchange, and the board of port wardens.

Provision has been made to buoy the newly formed channels by the United States Light-House Department.

Yours, truly,

G. S. WEBSTER, *Chief Engineer.*

Mr. THEO. C. KNAUFF,
Secretary, Board of Harbor Commissioners.

I 4.

IMPROVEMENT OF ICE HARBOR AT MARCUS HOOK, PENNSYLVANIA.

An account of this improvement is contained in the Annual Report of the Chief of Engineers for 1896, page 918.

Since 1889 expenditures have been confined to maintenance and repairs. During the fiscal year ending June 30, 1898, two landing piers were repaired and a new mooring post placed, at a cost of $700, including inspection and superintendence. The funds now available are considered sufficient for all probable necessities.

No work was done during the past fiscal year.

This work is located in the collection district of Philadelphia. This is the nearest port of entry, the collections during the year ending December 31, 1899, amounting to $20,748,258.22. The nearest fort and light-house are, respectively, Fort Mifflin and Cherry Island rear.

Money statement.

July 1, 1899, balance unexpended	$1,715.72
July 1, 1900, balance unexpended	1,715.72

APPROPRIATIONS.

Act of—		Act of—	
June 23, 1866	$5,000	August 5, 1886	$15,000
March 2, 1867	94,000	August 11, 1888	15,000
January 14, 1880	35,000	September 19, 1890	5,000
March 3, 1881	30,000		
August 2, 1882	15,000	Total	214,000

EXPENDITURES.

Total to June 30, 1900	$212,284.28

I 5.

CONSTRUCTION OF IRON PIER IN DELAWARE BAY, NEAR LEWES, DELAWARE.

An account of this work is contained in the Annual Report of the Chief of Engineers for 1896, page 920.

The river and harbor act of June 3, 1896, appropriated $7,660 for the maintenance and repair of this pier.

On September 11, 1896, a project for the application of the funds appropriated was submitted to the Department and approved September 18, 1896.

Under date of September 18, 1897, contract was entered into with William H. Virden, of Lewes, Del., for repairs to the pier in accordance with the adopted project approved September 18, 1896.

During the fiscal year ending June 30, 1898, the contract above referred to was completed, the following repairs having been made at a cost of $6,722.39, including inspection and superintendence: Forty-one fender piles were driven (40 on head of pier and 1 on the bridge); 42 fender piles shod with iron strips; 449 feet of wale on west side replaced by creosoted timber; 535 feet of wale on the east side, 720 feet of curbing, and the decking at the head of the pier replaced by new timber; a walk 3 feet wide laid on either side of the head of the pier and between the tracks for entire length of pier; the foot walk on the bridge repaired, and 3 supporting columns recovered and put back in place.

During the fiscal year ending June 30, 1899, a storage platform 150 feet long and 15 feet wide was constructed near the head of the pier at a cost of $100.

During the past fiscal year slight repairs were made to the pier at a cost of $17.01.

It is proposed to hold the sum of $837.61, which remains available, for maintenance and repairs as needed.

The funds now available are considered sufficient for present needs.

This pier is in the collection district of Delaware, the nearest port of entry being Wilmington, where the amount of revenue collected during the year ending December 31 ,1899, was $29,436.71. The nearest fort and light-house are, respectively, Fort Delaware and Delaware Breakwater light.

Money statement.

July 1, 1899, balance unexpended	$837.61
June 30, 1900, amount expended during fiscal year	17.01
July 1, 1900, balance unexpended	820.60

APPROPRIATIONS.

Act of—	
July 15, 1870	$225,000
June 23, 1874	10,000
March 3, 1875	25,000
March 3, 1875	15,000
August 14, 1876	30,000
June 18, 1878	20,000
March 3, 1879	10,500
June 14, 1880	$10,000
March 3, 1881	10,000
August 2, 1882	13,000
April 4, 1890	10,000
June 3, 1896	7,660
Total	386,160

EXPENDITURES.

Total to June 30, 1900	$385,339.40

I 6.

IMPROVEMENT OF DELAWARE BREAKWATER, DELAWARE.

An account of this improvement is contained in the Annual Reports of the Chief of Engineers for 1896, page 922; 1897, page 1214; and 1898, page 1094.

During the fiscal year ending June 30, 1899, a thorough examination of the breakwater was made. The final report on the work was submitted on June 19, 1899. This report is printed in the Annual Report of the Chief of Engineers for 1899, page 1346.

During the past fiscal year no work has been done in connection with this improvement.

The funds now available are considered sufficient for present needs, and it is proposed to hold the sum of $1,056.28, the available balance, for maintenance and repairs as needed.

The commercial statistics of the harbor at and in the vicinity of this breakwater are given in connection with the report on the harbor of refuge, Delaware Bay, Delaware.

This work is situated in the collection district of Delaware. Wilmington is the nearest port of entry, at which the revenue collected during the year ending December 31, 1899, was $29,436.71. Fort Delaware is the nearest fort and the Breakwater light the nearest light-house.

Money statement.

July 1, 1899, balance unexpended	$1,069.74
June 30, 1900, amount expended during fiscal year	13.72
July 1, 1900, balance unexpended	1,056.02

APPROPRIATIONS.

Act of—		Act of—	
May 7, 1822	$22,700.00	June 23, 1866	$107,910.00
May 23, 1828	250,000.00	March 2, 1867	109,493.70
April 23, 1830	162,000.00	August 2, 1882	125,000.00
March 2, 1831	208,000.00	July 5, 1884	75,000.00
July 3, 1832	270,000.00	August 5, 1886	56,250.00
March 3, 1833	270,000.00	August 11, 1888	100,000.00
June 28, 1834	270,000.00	September 19, 1890	80,000.00
March 3, 1835	100,000.00	July 13, 1892	50,000.00
July 2, 1836	100,000.00	August 18, 1894	50,000.00
July 4, 1836 (survey)	1,000.00	June 3, 1896	80,000.00
March 3, 1837	141,000.00		
July 7, 1838	150,000.00	Total	2,808,353.70
August 30, 1852	30,000.00		

Total amount appropriated under present project to June 30, 1900	$616,250.00

EXPENDITURES.

Total to June 30, 1900	$2,807,297.68
Total under present project to June 30, 1900	615,193.98

I 7.

CONSTRUCTION OF HARBOR OF REFUGE, DELAWARE BAY, DELAWARE.

An account of this improvement is contained in the Annual Report of the Chief of Engineers for 1897, page 1216.

During the fiscal year ending June 30, 1898, under a contract with Messrs. Hughes Bros. & Bangs, dated February 5, 1897, 289,709 tons of stone were deposited in the work, the total amount deposited to June 30, 1898, being 298,744 tons.

During the fiscal year ending June 30, 1899, under the same contract, 450,460 tons of stone were deposited in the work, the total amount deposited to June 30, 1899, being 749,204 tons.

During the past fiscal year, under the same contract, 345,895 tons of stone were deposited in the work, the total amount deposited to June 30, 1900, being 1,095,099 tons.

The contract above referred to provides for the complete execution of the work, to be paid for as appropriations may from time to time be made by law. It required the placing of 125,000 tons of stone during the year ending December 31, 1897, as estimated by the engineer officer in charge, under the terms of the contract; and for the continuance of the work as rapidly as may be required by the engineer officer in charge, to the extent of placing 280,000 tons during any one calendar year, provided sufficient funds are available for payment therefor. The work is required to be commenced on or before May 1, 1897, and to be completed on or before December 31, 1901, unless prevented by lack of funds.

On December 31, 1897, 131,106 tons of stone had been deposited in accordance with the terms of the contract. The condition of the work to June 30, 1900, was as follows:

Beginning at the stake light, which was erected May 4, 1897, to mark the initial point of the upper part of the work, and running S. SE. ⅞ E., for a distance of 5,280 feet, and thence S. by E. a farther distance of 2,720 feet, making a total length of 8,000 feet, the substructure had been brought to a width of about 41 feet at mean low water. The superstructure had been constructed for a distance of 1,790 feet and partly constructed for a farther distance of 3,560 feet.

In addition to the construction of the breakwater, the project for the harbor of refuge provides for the construction of a row of ten ice piers across the upper end of the harbor to protect it from ice descending the bay.

A project for the construction of these ice piers was submitted on April 5, 1900, and approved by the Secretary of War on April 23, 1900. Sealed proposals for the complete construction of the ten ice piers were opened on June 25, 1900. It is proposed to enter into a contract early in the coming fiscal year for the execution of the entire work.

This work is situated in the collection district of Delaware. Wilmington is the nearest port of entry, at which the revenue collected during the year ending December 31, 1899, was $29,436.71. Fort Delaware is the nearest fort, and the breakwater light is the nearest light-house.

Money statement.

July 1, 1899, balance unexpended		$754, 181. 16
Amount appropriated by sundry civil act approved June 6, 1900		450, 000. 00
		1, 204, 181. 16
June 30, 1900, amount expended during fiscal year		482, 136. 69
July 1, 1900, balance unexpended		722, 044. 47
July 1, 1900, outstanding liabilities	$136, 562. 38	
July 1, 1900, amount covered by uncompleted contracts	580, 592. 09	
		717, 154. 47
July 1, 1900, balance available		4, 890. 00
Amount (estimated) required for completion of existing project		213, 000. 00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for works of improvement		213, 000. 00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

Act of—		Act of—	
June 3, 1896	$5, 000	June 6, 1900	$450, 000
June 4, 1897	394, 334		
July 1, 1898	800, 000	Total	2, 026, 334
March 3, 1899	377, 000		

EXPENDITURES.

Total to June 30, 1900	$1, 304, 289. 53

Abstract of proposals for furnishing and placing stone in construction of ice piers in Delaware Bay, Delaware, opened June 25, 1900, by Lieut. Col. C. W. Raymond, Corps of Engineers.

[Approximate quantity to be placed in substructures of piers and as riprap, and in superstructures of piers, 64,500 tons of 2,000 pounds.]

No.	Name and address of bidder.	Per ton.	Amount.
1	Hughes Bros. & Bangs, Syracuse, N. Y	$2.25	$145,125

Contract not yet entered into.

CONTRACT IN FORCE, WITH NAMES OF CONTRACTORS, DATE OF APPROVAL, OF BEGINNING WORK, AND EXPIRATION.

With Hughes Bros. & Bangs, of Syracuse, N. Y., dated February 5, and approved February 20, 1897, for complete execution of the work of constructing a stone breakwater, to be paid for as appropriations may be made from time to time by law. To be commenced on or before May 1, 1897, and completed on or before December 31, 1901, unless prevented by lack of funds.

COMMERCIAL STATISTICS.

During the year ending December 31, 1899, the following vessels called at Delaware Breakwater for the reasons given:

	Steamers.	Ships.	Barks.	Brigs.	Schooners.	Barges.	Total.
For orders	153	18	19	3	20		213
For harbor	83	4	23	5	1,060	336	1,511
In distress				1	1		2
Quarantined							
Total	236	22	42	9	1,081	336	1,726

In addition to the above, about 2,200 craft under 30 tons have used the Breakwater for harborage.

I 8.

IMPROVEMENT OF RANCOCAS RIVER, NEW JERSEY.

An account of this improvement is contained in the Annual Report of the Chief of Engineers for 1896, page 925.

The original project, adopted in 1881, provided for the improvement of the main river and the Mount Holly Branch and contemplated no improvement in the Lumberton Branch. The river and harbor act of June 3, 1896, appropriated $2,000 for continuing this improvement, this sum to be expended in the improvement of the Lumberton Branch.

The Lumberton Branch was surveyed as far as Lumberton, N. J., in 1897 and a project for its improvement approved July 3, 1897.

The project provided for the formation, by dredging, of a channel 6 feet deep at mean low water and 30 feet wide through the shoals at Pattersons Landing and below and above Paxsons Landing as far as available funds would permit.

Under date of September 11, 1897, contract was entered into with Frank C. Somers, of Camden, N. J., for the dredging required by the project.

Work under this contract was commenced October 19, 1897, and completed November 5, 1897, 5,026 cubic yards having been dredged at a cost of $1,767.59, including inspection and superintendence. The cost of the survey of the Lumberton Branch, made during the fiscal year ending June 30, 1897, was $232.41.

By the work done a channel 30 feet wide and 6 to 7 feet deep at mean low water was formed through the shoals at Pattersons Landing and below Paxsons Landing and partly formed through the shoal above Paxsons Landing, the total lengths of channel aggregating 1,675 feet, thereby completing the work provided for in the project.

The river and harbor act of March 3, 1899, appropriated $2,000 for continuing this improvement, this sum to be expended in the improvement of the Lumberton Branch.

A project for the expenditure of this sum was approved April 8, 1899. The project provides for the formation by dredging of a channel 30 feet wide and 6 feet deep at mean low water through the shoals below Moores Landing and below Hainesport, as far as available funds will permit.

Under date of June 22, 1899, contract was entered into with John L. Mills, of Camden, N. J., for the dredging required by the project. The work of dredging under this contract was commenced on July 18, 1899, and completed on August 31, 1899. By the work done 5,879 cubic yards of material, place measurement, were dredged from the shoal below Moores Landing and deposited within the line of vegetation on the east side of the stream, forming a channel 6 to 7 feet deep at mean low water, over a width of 30 feet, for a length of 1,536 feet, entirely through the shoal.

This work is situated in the collection district of Burlington, N. J., which is the nearest port of entry, at which no revenue was collected during the year ending December 31, 1899. The nearest fort is Fort Mifflin, and the Horseshoe lights are the nearest light-houses.

Money statement.

July 1, 1899, balance unexpended	[1]$2,379.37
June 30, 1900, amount expended during fiscal year	1,912.14
July 1, 1900, balance unexpended	[1]467.23

APPROPRIATIONS.

Below the Forks.

Act of—		
March 3, 1881	$10,000.00	
August 2, 1882	10,000.00	
September 19, 1890	10,000.00	
		$30,000.00

Mount Holly Branch.

Act of—		
July 13, 1892	$5,000.00	
August 18, 1894	3,000.00	
		8,000.00

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[1] Of this amount $399.70 is balance remaining from appropriation of August 18, 1894, not available for expenditure under present project.

Lumberton Branch.

Act of—		
June 3, 1896	$2,000.00	
March 3, 1899	2,000.00	
		$4,000.00
Total		42,000.00

EXPENDITURES.

Total to June 30, 1900	$41,432.68
Carried to the surplus fund in July, 1890	100.09
Redeposited to credit of appropriation December 21, 1895	399.70

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the years ending December 31, 1898 and 1899.

Kind of vessel.	Arriving.				Departing.			
	1898.		1899.		1898.		1899.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Steamers	896	143,600	505	102,300	896	143,600	505	102,300
Sailing vessels	155	7,600	160	8,200	155	7,600	160	8,200
Barges and canal boats	1,687	421,750	1,624	454,730	1,687	421,750	1,624	454,730
Total	2,738	572,950	2,289	565,230	2,738	572,950	2,289	565,230

Freight statement.

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Chemicals	3,300	$23,800	3,800	$26,000
Coal	35,000	125,000	38,000	152,000
Fertilizer	3,000	16,500	3,000	16,000
Iron, pig	4,100	53,300	5,000	100,000
Lime	10,000	18,000	12,000	22,000
Lumber	....	....	300	6,350
Manure	78,000	97,000	68,000	94,500
Miscellaneous	6,480	287,300	6,100	300,000
Total	139,880	620,900	131,200	716,850
DEPARTING.				
Fish	200	16,000	210	17,500
Sand	150,300	150,000	246,742	211,158
Produce	5,620	595,000	3,120	420,000
Miscellaneous	5,780	282,500	6,000	320,000
Total	161,900	1,043,500	256,072	1,068,658

I 9.

IMPROVEMENT OF COOPER CREEK, NEW JERSEY.

An account of this improvement is contained in the Annual Reports of the Chief of Engineers for 1896, page 931; 1897, page 1123; 1898, page 1100, and 1899, page 1360.

During the past fiscal year no work has been done or liabilities incurred.

There is an available balance of $8,825.07 remaining from the appropriation of June 3, 1896, which it is proposed to use under another contract in completing the improvement according to project as soon as the city of Camden removes or lowers the water pipe at State Street Bridge below the plane of proposed dredging. The pipe at its present height limits the draft of vessels and destroys the value of the improvement. The project can be completed with the funds now available.

This work is located in the collection district of Philadelphia. This is the nearest port of entry. The collections during the year ending December 31, 1899, amounted to $20,748,258.22. The nearest fort and light-house are, respectively, Fort Mifflin and Upper Horseshoe range lights.

Money statement.

July 1, 1899, balance unexpended	$8,825.07
June 30, 1900, amount expended during fiscal year	.22
July 1, 1900, balance unexpended	8,824.85

APPROPRIATION.

Act of June 3, 1896	$37,000.00

EXPENDITURES.

Rebuilding dike on Government reservation in Delaware River at Woodbury Creek	$2,500.00
Improvement of Cooper Creek, New Jersey	25,675.15
Total to June 30, 1900	28,175.15

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the years ending December 31, 1898 and 1899.

Kind of vessel.	Arriving.				Departing.			
	1898.		1899.		1898.		1899.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Steamers	653	26,120	76	22,800	653	26,120	76	22,800
Sailing vessels	47	4,700	154	61,600	47	4,700	154	61,600
Barges and canal boats	833	166,600	1,134	232,800	833	166,600	1,134	232,800
Total	1,583	197,420	1,364	317,200	1,533	197,420	1,364	317,200

FREIGHT STATEMENT.

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Asphalt	....	....	105	$3,675
Bricks	....	....	135	1,360
Chemicals	13,177	$193,100	10,251	79,380
Clay	....	....	766	766
Coal	55,865	158,420	51,776	140,018
Fertilizer	6,174	80,300	6,790	88,330
Grain	562	7,600	1,400	20,000
Hay	1,215	9,423	2,211	19,248
Iron, pig	44,428	533,136	36,272	544,080
Iron, scrap	838	6,704	663	9,945
Lumber	600	7,500	300	6,300
Manure	23,500	36,500	25,750	38,075
Oil	9,200	126,000	8,078	130,977
Sand	5,000	7,000	15,949	11,585
Stone	....	....	650	650
Miscellaneous	5,144	237,044	2,215	135,452
Total	165,703	1,402,727	163,311	1,229,836
DEPARTING.				
Chemicals	77	1,540	85	1,694
Fertilizer	8,800	176,000	9,680	193,600
Iron, manufactured	19,535	390,700	13,357	333,925
Produce	35,000	650,000	37,500	720,600
Miscellaneous	1,500	123,750	1,850	162,500
Total	64,912	1,341,990	62,472	1,412,319

I 10.

IMPROVEMENT OF MANTUA CREEK, NEW JERSEY.

An account of this improvement is contained in the Annual Report of the Chief of Engineers for 1899, page 1364.

The project for this improvement was adopted by Congress in the river and harbor act of March 3,1899, which appropriated $25,000 for the improvement, subject to the following provision:

> *Provided,* That no part of any money appropriated for this project in excess of eight thousand dollars shall be expended for right of way privileges, easements, or other rights above the phosphate works and below Paulsboro, and no part thereof shall be expended for any such purpose unless all rights are secured for an amount not in excess of said sum of eight thousand dollars.

The authority of the Department was obtained to defer the submission of a project until it was ascertained whether all the right of way privileges, easements, and other rights between the phosphate works and Paulsboro could be acquired for the sum of $8,000, as provided in the act of March 3, 1899. Negotiations were entered into with the owners of the property through which the proposed cut-offs pass, but it was found that the right of way privileges and easements referred to in the act could not be obtained for the sum of $8,000, through the excessive price demanded by one owner. It was therefore recommended that proceedings be instituted for the acquirement of the necessary rights by condemnation. The property holders in question are Mr. Howard W. Miller and Mr. Matthew Gill. In the case of Mr. Miller, condemnation proceedings were instituted by the Department of Justice in August, 1899, and an award of $4,642.35 made to Mr. Miller for his damage. This amount was accepted by him without appeal.

Proceedings were about to be instituted in the case of Mr. Gill, when the latter made a written offer to sell the necessary rights through his property for the sum of $3,357.65. This sum being considered reasonable for the rights taken, and being, in conjunction with Mr. Miller's award within the limit of $8,000, as specified in the act, it was recommended that it be accepted and that the condemnation proceedings be discontinued. This recommendation has not yet been approved.

This work is located in the collection district of Philadelphia. This is the nearest port of entry, the collections during the year ending December 31, 1899, amounting to $20,748,258.22. The nearest fort and light-house are, respectively, Fort Mifflin and Tinicum Island range lights.

Money statement.

July 1, 1899, balance unexpended	$25,000.00
July 1, 1900, balance unexpended	25,000.00
Amount (estimated) required for completion of existing project	120,030.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	60,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Act of August 2, 1882	$3,000
Act of March 3, 1899	25,000
Total	28,000

EXPENDITURES.

Total to June 30, 1900	$3,000

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the years ending December 31, 1898 and 1899.

Kind of vessel.	Arriving.				Departing.			
	1898.		1899.		1898.		1899.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Steamers	1,113	55,975	1,154	62,854	1,113	55,975	1,154	62,854
Sailing vessels	785	66,400	776	65,800	785	66,400	776	65,800
Barges and canal boats	825	92,040	902	100,010	825	92,040	902	100,010
Car floats	105	15,750	136	20,400	105	15,750	136	20,400
Total	2,828	230,165	2,968	249,064	2,828	230,165	2,968	249,064

Freight statement.

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Bricks	575	$34,500	525	$35,000
Chemicals	8,845	142,880	7,505	77,400
Coal	6,000	24,000	6,600	21,400
Fertilizer material	13,964	350,000	19,500	253,000
Hay	3,000	12,000	3,100	14,000
Lumber	6,050	89,500	5,200	144,500
Machinery	300	30,000	350	35,000
Manure	33,000	66,000	33,000	66,000
Salt	350	5,250	800	5,000
Sand	1,000	1,000	1,000	750
Stone	2,200	8,500	2,500	9,750
Miscellaneous	6,250	463,500	6,560	480,000
Total	81,534	1,227,130	86,140	1,141,800
DEPARTING.				
Chemicals	1,500	15,000	1,910	25,500
Fertilizers (manufactured)	16,300	326,000	24,350	390,750
Manufactured goods	3,500	140,000	3,650	160,000
Sand and gravel	12,000	12,000	14,100	14,100
Truck, produce, and grain	30,400	729,600	33,000	778,500
Wood (cord)	350	1,050	400	1,200
Miscellaneous	2,000	40,000	2,100	42,000
Total	66,050	1,263,650	79,510	1,412,050

I 11.

IMPROVEMENT OF ALLOWAY CREEK, NEW JERSEY.

An account of this improvement is contained in the Annual Report of the Chief of Engineers for 1896, page 928, and for 1899, page 1358.

The river and harbor act of March 3, 1899, appropriated $3,000 for continuing this inprovement. A project for the expenditure of this sum was approved April 8, 1899. The project provides for enlarging, by dredging, existing channels at the shoals below Upper Hancock Bridge, viz, at Lower Bradways, Smith Reeves, and below the Square to a width of 75 feet and depth of 6 feet at mean low water; and above Upper Hancock Bridge, for the formation of a channel, by dredging, 60 feet wide and 6 feet deep at mean low water through the shoals at Upper Bradways, below Robinsons Landing, above Robinsons Landing, Lower Fowsers, Upper Fowsers, Lower Lamberts, Upper Lamberts, and at Quinton, as far as available funds will permit.

Under date of June 22, 1899, a contract was entered into with the River and Harbor Improvement Company, of Camden, N. J., for the work required by the project.

During the past fiscal year operations under this contract were in progress from July 20, 1899, to August 29, 1899, when the work was completed. The shoals at Smith Reeves, below the Square, below and above Robinsons Landing, Upper and Lower Fowsers, Upper and Lower Lamberts, and Quinton, were dredged to the specified depths and widths. The total amount of material removed under this contract was 14,690 cubic yards, place measurement, and the total length of channel improved was 5,412 feet. The total cost of the work, including inspection and superintendence, was $2,923.46. About four-fifths of the work provided by the project has been accomplished.

This work is situated in the collection district of Bridgeton, N. J., which is the nearest port of entry, at which the revenue collected during the year ending December 31, 1899, amounted to $21. The nearest fort is Fort Delaware, and the Reedy Island light is the nearest light-house.

Money statement.

July 1, 1899, balance unexpended	$3,021.89
June 30, 1900, amount expended during fiscal year	3,021.89
Amount (estimated) required for completion of existing project	7,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance avaliable July 1, 1900	7,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

Act of—		Act of—	
September 19, 1890	$6,000	June 3, 1896	$3,000
July 13, 1892	3,000	March 3, 1899	3,000
August 18, 1894	3,000		
		Total	18,000

EXPENDITURES.

Total to June 30, 1900	$18,000

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the years ending December 31, 1898 and 1899.

Kind of vessel.	Arrivals.				Departures.			
	1898.		1899.		1898.		1899.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Steamers	65	7,000	65	7,200	65	7,000	65	7,200
Sailing vessels	20	2,000	20	2,000	20	2,000	20	2 000
Barges and canal boats	60	9,000	60	10,500	60	9,000	60	10,500
Total	145	18,000	145	19,700	145	18,000	145	19,700

Freight statement.

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Coal	9,000	$20,000	9,500	$22,500
Glass sand	16,000	18,000	11,600	22,400
Lumber	2,500	30,000	3,000	35,000
Oyster shells	2,500	5,000	3,000	5,500
Soda ash	450	7,000	500	7,800
Tin plate	1,500	100,000	1,800	110,000
Miscellaneous	2,000	31,000	11,500	195,000
Total	33,950	211,000	40,900	398,200
DEPARTING.				
Canned goods	8,000	375,000	9,000	400,000
Glass	2,000	125,000	2,300	150,000
Grain	2,400	40,000	2,500	41,000
Produce	1,100	10,000	1,200	12,000
Ship timber	125	2,500	125	2,500
Miscellaneous	1,500	3,000	2,000	3,700
Total	15,125	555,500	17,125	609,200

I 12.

IMPROVEMENT OF GOSHEN CREEK, NEW JERSEY.

An account of this improvement is contained in the Annual Reports of the Chief of Engineers for 1896, page 933; 1897, page 1225; 1898, page 1102, and 1899, page 1362.

The river and harbor act of March 3, 1899, appropriated $8,000 for the completion of this improvement. During the fiscal year ending June 30, 1899, a project for the expenditure of this sum and the unexpended balance of the previous appropriation was submitted and approved April 21, 1898.

The project provides for the strengthening of the existing dike by the use of either sheet piling or brush wattling, riprapping its lower side with stone, and afterwards filling it with dredged material; for the construction of about 400 feet of brush and stone dike to connect the present dike with the shore at high-water mark; for the building of a similar dike of brush and stone 180 feet in length, or longer if funds will permit, on the north side of the entrance to the creek; for the redredging of the channel through the bar to a depth of 3 feet at mean low water over a width of 50 feet; to extend this channel by dredging about 700 feet to deep water inside the mouth of the creek, and thence to dredge a channel of the same depth over a width of 30 feet to the lower end of the existing dredged channel in the creek, the dredged material to be deposited as a filling for the existing dike and as a backing for those proposed.

Under date of May 19, 1899, an informal agreement was entered into with E. P. Hand and Charles R. Mixner, of Cape May Court-House, N. J., for furnishing and delivering brush and poles for the proposed brush and stone dikes to be constructed under the above project.

Under this agreement work was commenced June 1, 1899, and at the close of the fiscal year ending June 30, 1899, was still in progress, 310 cords of brush and 150 poles having been delivered. During the past fiscal year work under this agreement was in progress until July

18, 1899, when it was completed, the total amount of material delivered under it being 428 cords of brush and 150 poles.

Under date of June 2, 1899, an informal agreement was entered into with the Delaware Construction Company, of Wilmington, Del., for furnishing and delivering the stone required for the work under the project. Under this agreement work was commenced June 14, 1899, and at the close of the fiscal year ending June 30, 1899, was still in progress, 371 tons of stone having been delivered. During the past fiscal year work under the agreement was in progress until August 3, 1899, when it was completed, the total amount of stone delivered being 1,672.34 tons.

By hired labor the brush and stone furnished under the above agreements were used in wattling the existing dike, and riprapping its lower side, and in the construction of two parallel brush and stone dikes—one connecting the pile dike with the shore at high-water mark, and the other, on the north side of the entrance, extending out from high-water mark. The total length of the dikes thus constructed was 680 feet, and the cost of the work above mentioned including material, labor, inspection, and superintendence, was $7,300.05.

Under date of July 11, 1899, a contract was entered into with the Delaware Construction Company, of Wilmington, Del., for dredging a channel 3 feet deep at mean low water through the shoals obstructing the mouth of the creek.

Under this contract work was commenced on September 5, 1899, and completed on September 18, 1899, the total amount of material removed being 10,436 cubic yards, dipper measurement. Most of the material dredged from outside the mouth of the creek was used as filling for the pile dike and backing for the stone dikes constructed to protect the creek entrance. The material from the cut inside the mouth was deposited on the banks adjacent to the cut. The total length of channel dredged to the specified dimensions was 2,100 feet, of which a length of 1,300 feet was dredged to a width of 50 feet, and the remaining 800 feet to a width not less than 30 feet. The cost of the work including inspection and superintendence was $1,344.69.

By hired labor 150 feet of the south brush and stone dike, which had been thrown out of alignment by the settling of the mud bottom on which it was laid, was repaired at a cost of $86.65.

It is proposed to hold the sum of $841.90, which remains available, for maintenance and repairs which may become necessary from time to time. The funds now available are considered sufficient for all probable needs.

This work is situated in the collection district of Bridgeton, N. J., which is the nearest port of entry, at which the revenue collected during the year ending December 31, 1899, amounted to $21. The nearest fort is Fort Delaware, and the Maurice River light is the nearest light-house.

Money statement.

July 1, 1899, balance unexpended	$9,540.09
June 30, 1900, amount expended during fiscal year	8,698.19
July 1, 1900, balance unexpended	841.90

APPROPRIATIONS.

Act of—	
July 13, 1892	$3,000
August 18, 1894	3,000
June 3, 1896	3,000
March 3, 1899	8,000
Total	17,000

EXPENDITURES.

Total to June 30, 1900	$16,158.10

COMMERCIAL STATISTICS.

Arrivals and departures of vessels for the years ending December 31, 1898 and 1899.

Kind of vessel.	Arrivals.				Departures.			
	1898.		1899.		1898.		1899.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
Sailing vessels	120	3,000	100	2,500	120	3,000	100	2,500

Freight statement.

Articles.	1898.		1899.	
	Tons.	Value.	Tons.	Value.
ARRIVING.				
Bricks	2,600	$17,800	2,000	$8,000
Coal	1,800	5,400	1,800	7,200
Fertilizer	1,600	42,000	1,200	15,200
Grain	5,400	75,600	5,500	115,500
Lumber	3,200	35,000	3,200	67,200
General merchandise	2,000	200,000	2,200	220,000
Total	16,600	375,800	15,900	433,100
DEPARTING.				
Fertilizer	900	4,500	500	6,000
Hay	3,500	21,000	3,500	24,500
Oysters and clams	2,500	98,000	2,500	100,000
Potatoes	600	7,800	600	8,200
Sand	4,500	2,200	3,000	1,500
Wood	1,500	4,500	1,500	6,000
General merchandise	2,500	50,000	3,000	60,000
Total	16,000	188,000	14,600	206,200

I 13.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

During the past fiscal year nine wrecks have been removed under the authority of the act of Congress approved March 3, 1899.

In September, 1895, the three-masted schooner *Lottie K. Friend*, with a cargo of coal, was sunk in Delaware Bay in collision with another vessel about 1¼ miles west from Ship John Light. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of February 8, 1897, a contract was entered into with Thomas Poynter and Elijah D. Register, of Lewes, Del., for the removal of the wreck for the sum of $1,100, the work to be completed on or before April 25, 1897. At the close of the fiscal year ending June 30, 1897, the removal of the wreck had been commenced but had not been completed. During the fiscal year ending June 30, 1898, no additional work had been done toward the removal of the wreck under the above contract, and on June 16, 1898, it was recommended that the contract be annulled and the remaining wreckage be removed by dredging at some time when dredging operations were in progress in the neighborhood. This recommendation was approved on June 18, 1898. Since that time nothing has been done toward the removal of the wreck.

In October, 1898, the sloop *John W. Elliott* was sunk without cargo on the western edge of the eastern channel of the Delaware River at a point opposite the mouth of Alloway Creek, New Jersey. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of June 17, 1899, a contract was entered into with Virden & Ross, of Lewes, Del., for the removal of the wreck for the sum of $220. The work of removal, which was commenced during the fiscal year of 1899, was completed in July, 1899.

During the winter 1898-99 the canal boat *William Cummings* was sunk in the Schuylkill River, Pennsylvania, a short distance below the Baltimore and Ohio Railroad Bridge in the city of Philadelphia. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of August 10, 1899, a contract was entered into with Frederick Craemer, trading as Craemer Derrick and Wrecking Company, of Philadelphia, Pa., for the removal of the wreck for the sum of $245. The work of removal was completed in October, 1899.

In June, 1899, the schooner *Addie Ludington* was sunk in the main ship channel of Delaware Bay, about 1⅛ miles from Brandywine Shoal Light. The wreck being considered a dangerous obstruction to navigation, it was recommended that the masts, bowsprit, and rigging of the wreck be removed from the waterway, and that the other portions be broken up, leveled, and scattered. Under date of August 30, 1899, a contract was entered into with the International Wrecking, Salvage and Submarine Company, of Atlantic City, N. J., for performing the work for the sum of $145. The work of removal was completed in October, 1899.

In June, 1899, the three-masted schooner *George A. Howes* was capsized in a squall off the New Jersey coast. The wreck, when examined, was found to be about 3 miles off of Barnegat Light, New Jersey, swinging with the tide, and appeared to rest but lightly on the bottom. The wreck being considered a dangerous obstruction to navigation, it was recommended that the masts, bowsprit, and rigging be removed from the waterway, and that other parts of the wreck be broken up, leveled, and scattered. Under date of October 9, 1899, a contract was entered into with William D. Johnston, of Lewes, Del., for performing this work for the sum of $325. In the stormy weather, which occurred in the latter part of October, 1899, the wreck was either broken up by the waves, or washed far out to sea, and when the contractor was in readiness to commence the work of removal in November, 1899, no trace of the wreck could be found. Operations for the removal of the wreck were therefore discontinued.

In October, 1899, the canal boat *James McNeal*, with a cargo of crushed stone, was sunk in the main ship channel of the Delaware River at a point nearly opposite the prolongation of Snyder avenue, Philadelphia. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of November 14, 1899, an informal agreement was made with the Delaware Construction Company, of Wilmington, Del., for the complete removal of the wreck for the sum of $500. The work of removal was completed in December, 1899.

In November, 1899, the stern compartment of the canal boat *Victory*, with a cargo of sand, was sunk in the channel of the Delaware River about one-third of a mile above the mouth of Pennypack Creek, Pennsylvania. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of March 13, 1900, an agreement was entered into with the River and Harbor Improvement Company, of Camden, N. J., for the removal from the waterway of all parts of the wreck and contents for the sum of $225. The work of removal was completed on March 29, 1900.

On November 30, 1899, the schooner *Clara*, with a cargo of sand, was sunk in the channel of the Delaware River about 2 miles below Billingsport, N. J. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of December 27, 1899, an open-market agreement was made with Mr. Thomas G. Truitt, of Philadelphia, Pa., for the removal of this wreck for the sum of $600. Owing to the failure of Mr. Truitt to commence operations within the specified time, this agreement was annulled on January 8, 1900, and on January 17, 1900, an open-market agreement was made with the Philadelphia Construction Company for the removal of the wreck for the sum of $580. The work of removal was completed in May, 1900.

In February, 1900, the canal boat *May* slid from the bank of Maurice River, New Jersey, into the channel of the stream and sank just below Frenchs Bar. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of April 3, 1900, an agreement was entered into with Charles W. Johnston, of Lewes, Del., for completely removing from the waterway all parts of the wreck and contents for the sum of $236. The work of removal was completed on May 3, 1900.

In December, 1899, the canal boat *James Gillan* was sunk in the channel of the Schuylkill River about one-fourth mile above Yankee Point. The wreck being considered a dangerous obstruction to navigation, its removal was recommended. Under date of May 7, 1900, an agreement was entered into with the River and Harbor Improvement Company, of Camden, N. J., for the complete removal from the waterway of all parts of the wreck and cargo for the sum of $400. The work of removal was completed on May 24, 1900.

In March, 1900, the canal boat *Frank Dodson*, while loaded with coal, was sunk in Chester Creek, Pennsylvania, by striking a broken-off piling. The wreck when examined was found lying in the channel of Chester Creek about 500 feet above the mouth. The wreck being considered a dangerous obstruction to navigation, it was recommended that it be removed from the waterway. Sealed proposals for the removal of the wreck will be opened July 2, 1900.

In April, 1900, the two-masted schooner *Druzilla B. Lee* was burned to the water's edge while at anchor in Dennis Creek, New Jersey. The wreck when examined was found to be lying in the middle of the channel of Dennis Creek, New Jersey, about one-third mile above the mouth. The wreck being considered a dangerous obstruction to navigation, it was recommended that it be removed from the waterway. Under date of June 25, 1900, an informal agreement was entered into with C. H. Bowne, of Jersey City, N. J., for the removal of the wreck for the sum of $93. The work of removal of this wreck has not yet been completed.

The amount expended during the past fiscal year upon removal of wrecks is $2,905.53.

Abstract of proposals for removal of the wreck of canal boat William Cummings, lying in Schuylkill River, opened July 31, 1899, by Lieut. Col. C. W. Raymond, Corps of Engineers.

No.	Name and address of bidder.	Price.
1	River and Harbor Improvement Co., Camden, N. J	$349
2	Frederick Craemer, trading as Craemer Derrick and Wrecking Co., Philadelphia, Pa	245
3	International Wrecking, Salvage and Submarine Co., Atlantic City, N. J	365
4	Philadelphia Construction Co., Philadelphia, Pa	288
5	Charles W. Johnston, Lewes, Del	374

Contract (dated August 10, 1899) entered into with Frederick Craemer, trading as Craemer Derrick and Wrecking Company.

Abstract of proposals for removal of wreck of schooner Addie Ludington, lying in Delaware River, opened August 21, 1899, by Lieut. Col. C. W. Raymond, Corps of Engineers.

No.	Name and address of bidder.	Price.
1	International Wrecking, Salvage and Submarine Co., Atlantic City, N. J	$145
2	Charles W. Johnston, Lewes, Del	279
3	John L. Mills, Camden, N. J	450

Contract (dated August 30, 1899) entered into with the International Wrecking, Salvage and Submarine Company.

Abstract of proposals for removal of wreck of schooner George A. Howes, lying about 3 miles E. by N. ½ E. off Barnegat Inlet, New Jersey, opened September 28, 1899, by Lieut. Col. C. W. Raymond, Corps of Engineers.

No.	Name and address of bidder.	Price.
1	International Wrecking, Salvage and Submarine Co., Atlantic City, N. J	$345
2	William D. Johnston, Lewes, Del	325
3	John W. Chittenden, New York, N. Y	900

Contract (dated October 9, 1899) entered into with William D. Johnston, Lewes, Del.

I 14.

EXAMINATION AND SURVEY OF RACCOON CREEK, NEW JERSEY.

[Printed in House Doc. No. 231, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 18, 1899.

Sir: I have the honor to submit the accompanying copies of reports dated May 17 and December 11, 1899, respectively, with map,[1] by

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[1] Not reprinted. Printed in House Doc. 231, Fifty-sixth Congress, first session.

Lieut. Col. C. W. Raymond, Corps of Engineers, giving the results of a preliminary examination and survey of Raccoon Creek, New Jersey, made to comply with the provisions of the river and harbor act of March 3, 1899.

The plan of improvement proposed is the formation of a dredged channel 7 feet deep and 75 feet in width at mean low water from the mouth 1¾ miles to Bridgeport, thence a channel of the same depth and 60 feet in width to Springers wharf, and thence a channel 5 feet deep at mean low water, and 40 feet in width, to the head of navigation at Swedesboro, together with the widening of the channel around sharp bends, all at an estimated cost of $102,135. The limits of the proposed dredging are shown upon the accompanying map.

Colonel Raymond states that $25,000 could be profitably expended in the first fiscal year.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF RACCOON CREEK, NEW JERSEY.

Engineer Office, United States Army,
Philadelphia, Pa., May 17, 1899.

General: In compliance with instructions contained in Department letter dated March 15, 1899, I have the honor to submit the following report upon a preliminary examination of Raccoon Creek, New Jersey, made under my direction by Mr. Ellis D. Thompson, assistant engineer, in accordance with a provision of the river and harbor act of March 3, 1899.

This creek rises in Gloucester County, flows in a northwesterly direction, and empties into the Delaware River at a point opposite Marcushook, Pa. The head of navigation is at Swedesboro, 9¼ miles above the mouth, where the stream is crossed by a highway bridge without a draw. At this point the low-water width is about 60 feet and the low-water depth about 2 feet.

From Swedesboro to Bridgeport, 7½ miles below, the stream winds through a valley of low meadows, occasionally touching the fast land on either side. The meadows lie from 2 to 3 feet below high water, and are usually protected against overflow by earthen banks.

More breaches in the banks occur within the first 3 miles below Swedesboro than elsewhere.

The stream leaves fast land at Bridgeport, and from thence to the mouth its course is entirely through meadows. At the mouth the low-water width becomes 275 feet, and the low-water depth from 9 to 10 feet.

The stream is obstructed by many sharp bends and gravel shoals, most of which are between Swedesboro and Davenports Landing, 5 miles below Swedesboro. The shoals limit the high-water draft from the mouth to Davenports Landing to about 7½ feet, and from thence to Swedesboro to about 6½ feet. In the pools between the shoals from the mouth to Davenports Landing the channel depths vary from 6 to

15 feet at low water. Above Davenports Landing the depths in the pools are from 5 to 13 feet.

The average rise and fall of the tides is about 6 feet at the mouth, decreasing to 5.4 feet at Davenports wharf and 4.5 feet at Swedesboro. The bottom is usually mud and sand with hard gravel ridges. There are no tributaries of consequence.

The stream is crossed by bridges as follows:

Kind of bridge.	Locality.	Clear bay of drawspan.
		Feet.
Iron highway	Main street, Swedesboro	None.
Swedesboro Railroad, wood and iron	Swedesboro	*a* None.
Highway, wood and iron	¾ mile below Swedesboro	30
Delaware River Railroad, wood	Bridgeport	*b* 36.3
Highway, iron draw and pile approaches	do	36

a Clear height of span above low water, 22 feet; clear width of span, 25 feet.
b Measured on axis of bridge.

This stream was surveyed in 1882, and a project for its improvement was submitted on February 26, 1883. It provided for the formation of a channel with a mean low-water depth of 4 feet and a bottom width of 40 feet through the shoal at Springers wharf and from the Horseshoe to the Swedesboro Railroad Bridge, and thence a depth of 3 feet and the same width along the pier line of Swedesboro, the estimated amount of material to be removed being placed at 26,000 cubic yards and the cost of the improvement at $17,940. No work of improvement was done under this project on account of lack of sufficient funds.

The principal obstructions to navigation are—

1. The shoal water extending almost continuously from Swedesboro to the foot of Molonox Shoal, 2 miles below Swedesboro and just above the Horseshoe. The prevailing low-water depths in this reach vary from 2 to 4 feet, with occasional small holes of 5 to 6 feet depth. There are eight distinct shoals within this distance, varying in length from 300 to 2,400 feet, with minimum depths of 2 feet. The bottom is in most cases hard gravel mixed with sand and some mud.

2. Between Molonox Shoal and Springers Bar, 4¾ miles below Swedesboro, there are eleven shoals, varying in length from 200 to 500 feet, on which the low-water depths are from 2 to 5 feet. In this reach are many deep pools with depths between 6 and 13 feet. The shoal water is usually on the crossings between these pools. Much of the bottom is gravel, but there is probably more mud and sand than in the reach above.

3. The shoal at Springers Bar extends from above Springers wharf to below Davenports wharf, a distance of about 2,400 feet. The low-water depths average between 2.5 and 3 feet. There are some deep holes with depths from 6 to 9 feet, but the channel through these is narrow, and bad navigation exists for the entire distance given above. The bottom is mostly sand with some gravel.

4. At Justices, 6¼ miles below Swedesboro, there is a length of 1,000 feet where the channel is narrow and obstructed by shallow water, the principal shoal being "Justices Gravel," on which the low-water depth is from 2 to 3 feet. There is a projecting point in this reach which narrows the channel.

5. At Kirbys, 6½ miles below Swedesboro, the channel has a low-water depth of 4 to 5 feet for a length of 900 feet between pools, but it is narrow and needs widening.

6. Between Kirbys Landing and Schlags, 6¾ miles below Swedesboro, there is a shoal about 800 feet long on which the least low-water depth is 3 feet. The bottom is hard and stony.

7. At Devlins Island, 7 miles below Swedesboro, there is a very sharp bend with two navigable channels. The upper or flood-tide channel is the one generally used. It has a depth varying from 4 to 5 feet over a length of 650 feet. The lower or ebb-tide channel has a low-water depth of 6 to 8 feet, but is narrow, crooked, and difficult to navigate.

8. At "Grays Gravel," 7½ miles below Swedesboro, the channel is narrow, but has a low-water depth varying from 4 to 7 feet.

9. Between the bridges at Bridgeport, 7¾ miles below Swedesboro, the channel has for a length of 600 feet a low-water depth of 6 feet, but is narrow. The bottom is sand and gravel.

10. In the bend below Bridgeport, 8½ miles below Swedesboro, there is ample depth, but the shoal on the point projects into the channel, making it narrow and difficult to navigate. The bottom is sand and mud.

11. Between 8½ and 9¼ miles below Swedesboro is "Potato Hills Shoal," so called on account of the irregular bottom, with a length of 3,600 feet. The bottom is mud and sand. In this distance the low-water depths vary from 3 to 7 feet. This shoal is stated to be the worst obstruction in the river.

12. The channel through the bar at the mouth of the creek is narrow, but fairly straight, and has a low-water depth of about 7 feet. It is protected on its lower side by a gravel jetty, rising to nearly low water, formed during the progress of the improvement of Philadelphia Harbor, to prevent dredged material deposited in the Delaware River east of Marcushook Bar from washing into the mouth of the creek.

For purposes of commerce the creek is divided into two sections, viz:

(1) From Swedesboro to Springers wharf.
(2) From Springer's wharf to the mouth.

Swedesboro is a thriving town located 9¾ miles above the mouth in a rich agricultural country and has a population of about 1,500.

The only manufactory is the Swedesboro Glass Works. There are, however, 57 places of business, comprising a large variety of general stores, mills, blacksmith shops, etc., which supply the surrounding farms for a radius of several miles. The main industry is the raising of produce, of which the daily shipments by rail in season are from 30 to 50 carloads, in addition to large shipments by water.

Besides 4 landings at Swedesboro, there are between Swedesboro and Springers, 10 farm landings, the principal one being at Leaps, 4 miles below Swedesboro and 5¾ miles above the mouth, from which 15 farms ship their products. Springers wharf, 5 miles above the mouth, is the outlet for about 50 farms.

Bridgeport, 2 miles above the mouth, has a population of about 700, no manufactories, and 13 places of business. Its commercial importance is derived from its being the shipping point for about 75 truck farms and a large fishing industry.

Between Springers wharf and Bridgeport there are farm landings at Davenports and Kirbys and a sand wharf at Schlags.

All the above towns and landings export truck and import coal, lumber, manure, fertilizers, merchandise, stone, hay, etc. The shipments of sand amount to about 5,000 tons.

From Swedesboro down, commerce is carried on by four naphtha boats, with a draft of 3 to 4 feet, carrying produce and making regular trips throughout the trucking season, about 720 round trips in all; by barges and canal boats, with a draft of 5 to 6 feet and capacity of 125 to 300 tons, carrying manure, coal, and lumber, and towed by tugs, making 125 round trips, and by steam barge *Willie*, capacity 175 tons, carrying coal, making 20 round trips. In addition to these are sailing vessels carrying hay and produce, making about 25 round trips.

From Springers wharf down, the commerce is carried on by two steamers, the *Anna and Mary*, draft 6 feet and capacity 175 tons, and the *Ruth B. Lute*, draft 6½ feet, capacity 300 tons, making regular trips from June to November to Chester, Wilmington, and Philadelphia, about 204 round trips during the season; 5 naphtha boats carrying produce, with a capacity of 5 to 20 tons each, making 720 round trips; 25 sailing vessels running irregularly and carrying hay and produce, making about 50 round trips; barges and canal boats with capacities varying between 125 and 300 tons, carrying manure, coal, sand, etc., making 100 trips, and tugboats and steamers carrying oyster shells, merchandise, and miscellaneous articles, making about 130 round trips.

Boats usually time their departure so as to cross Potato Hills Shoal at high water. This necessitates stemming the tide to Philadelphia. The annual water commerce is estimated as follows:

Springers wharf to the mouth.—Three hundred and thirty-four steam, 720 naphtha, and 160 sail vessels, canal boats, and barges; 62,054 tons of freight, valued at $569,150.

Swedesboro to the mouth.—One hundred and forty-five steam, 720 naphtha, and 175 sail vessels, canal boats, and barges; 110,786 tons of freight, valued at $705,800.

Summary.—Four hundred and seventy-nine steam, 1,440 naphtha, and 335 sail vessels, canal boats, and barges; 172,840 tons of freight, valued at $1,274,950.

The improvement asked for by shippers is the formation of a channel 8 feet deep and 80 feet wide from the mouth to Springers wharf, and thence a channel 6 feet deep and 60 feet wide to the highway bridge at Swedesboro.

Potato Hills Shoal, Springers Bar, and the shoal water extending 2 miles below Swedesboro are the worst obstructions. Their removal would benefit the whole creek and enable shipments of perishable articles to be made with greater facility. The improvement of the whole stream would largely increase the present commerce. The trucking interests are very large, and farmers depend principally on water transportation to obtain manure and other fertilizers and to get their crops cheaply to market. With better navigation facilities it is probable that manufacturers would be attracted to the locality, which is favorably situated for such purposes.

Full commercial statistics for the year ending December 31, 1898, compiled from statements submitted by leading shippers and merchants, are appended to this report. These statistics show that since the survey of the stream in 1882 the value of the commerce has increased from $304,895 to $1,274,950 at the present time.

In my opinion, the stream is worthy of improvement by the General Government. The cost of a survey for the purpose of preparing a plan and estimate for its improvement is placed at $650.

Very respectfully, your obedient servant,

C. W. RAYMOND,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Raccoon Creek, New Jersey.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

Commercial statistics, Raccoon Creek, New Jersey, for the year ending December 31, 1898.

VESSEL STATEMENT.

Kind of vessel.	Number.	Tonnage.	Arriving.	Departing.
Springers wharf to mouth:				
Steamers	334	62,700	334	334
Naphtha boats	720	16,680	720	720
Sailing vessels	50	3,000	50	50
Barges and canal boats	100	20,000	100	100
Swedesboro to mouth:				
Steamers	145	19,500	145	145
Naphtha boats	720	15,120	720	720
Sailing vessels	50	1,500	50	50
Barges and canal boats	125	21,875	125	125
Totals:				
Steamers	479	82,200	479	479
Naphtha boats	1,440	31,800	1,440	1,440
Sailing vessels	100	4,500	100	100
Barges and canal boats	225	41,875	225	225
Aggregate	2,244	160,375	2,244	2,244

Commercial statistics, Raccoon Creek, New Jersey, etc.—Continued.

FREIGHT STATEMENT.

Articles.	Arriving.		Departing.	
	Tons.	Value.	Tons.	Value.
Swedesboro to mouth:				
Manure	60,000	$96,000		
Coal	3,000	15,000		
Lumber	536	8,000		
Grain	2,500	40,000		
Hay	600	3,600		
General merchandise	1,500	150,000		
Phosphate	300	9,000		
Produce			30,000	$300,000
Oyster shells	1,000	1,500		
Sand			5,000	7,500
Brick	3,000	18,000		
Stone	2,000	3,300		
Plaster stone	300	900		
Oysters	200	3,000		
Glass			850	50,000
Total	74,936	348,300	35,850	357,500
Springers wharf to mouth:				
Manure	5,000	8,750		
Coal	1,500	7,500		
Lumber	268	5,000		
Hay	250	2,500	250	2,500
General merchandise	500	50,000		
Phosphate	200	6,000		
Produce			46,600	466,000
Oyster shells	2,000	3,200		
Sand			5,000	8,750
Brick	200	1,200		
Oysters	250	3,750		
Fish	36	4,000		
Total	10,204	91,900	51,850	477,250

TOTAL COMMERCE.

	Arriving.		Departing.	
	Tons.	Value.	Tons.	Value.
From Springers Wharf	10,204	$91,900	51,850	$477,250
From Swedesboro	74,936	348,300	35,850	357,500
Total	85,140	440,200	87,700	834,750

	Tons.	Value.
Arriving	85,140	$440,200
Departing	87,700	834,750
Total	172,840	1,274,950

SURVEY OF RACCOON CREEK, NEW JERSEY.

ENGINEER OFFICE, UNITED STATES ARMY,
Philadelphia, Pa., December 11, 1899.

GENERAL: In compliance with instructions contained in Department letter dated August 18, 1899, I have the honor to transmit herewith a tracing of a survey of Raccoon Creek, New Jersey, made under my direction in accordance with a provision of the river and harbor act of March 3, 1899, by Mr. R. G. Pearson, United States surveyor, and also to submit the following project for improvement:

This creek rises in Gloucester County, flows in a northwesterly direction, and empties into the Delaware River at a point nearly opposite Marcushook, Pa.

It is navigable at high water for a distance of 1¾ miles above its mouth to Bridgeport for vessels of 9 feet draft; thence 3¼ miles farther to Springers wharf for vessels drawing 7 feet, and thence 4¾ miles to Swedesboro, the head of steam navigation, for boats and barges having a draft of 4 feet. Above Swedesboro the stream is narrow, shoal, and very crooked.

The navigable portion, when it leaves fast land, winds through meadows lying 2 or 3 feet above low water, which, except for the 2 miles immediately below Swedesboro, are generally protected from overflow by revetted earthen banks.

Navigation is much obstructed by bars and a few sharp bends.

The average range of tide at the confluence with the Delaware River is 6 feet; at Bridgeport, 1¾ miles above the mouth, it is also 6 feet; at Kirbys Landing, 3 miles above the mouth, 5.8 feet; at Davenports wharf, 4½ miles from the mouth, 5.6 feet; at Leaps wharf, 5¾ miles from the mouth, 5.6 feet; at Adolph Blacks wharf, 7¾ miles above the mouth, 5.3 feet, while at Swedesboro it is 4.9 feet, though at the latter place it it considerably influenced by winds and freshets. This latter rise and fall at such a distance from the mouth of the stream is unusual, showing a remarkably regular propagation of the tidal wave. Both low and high water occur one and one-half hours later at Swedesboro than at the mouth.

For navigation purposes the stream is divided into two sections:

	Miles.
1. From Swedesboro to Springers wharf	4¾
2. From Springers wharf to the mouth	5

Swedesboro to Springers wharf.—In this section the low-water widths vary from 30 feet at Swedesboro, to 90 feet at Springers wharf, the corresponding distances between banks being 100 and 180 feet. The channel depths vary from 0.6 foot at Swedesboro to 3 feet at Springers.

In the upper half of this section the channel is very narrow and quite shoal. The low-water channel has an average width of about 60 feet, while the low-water depths range generally from 1 to 4 feet, with occasional small holes at the bends in which the depths are greater than 6 feet.

In the lower half of the section the average low-water width increases to 90 feet, while the low-water depths increase from 3 to 7 feet. The number and extent of the reaches containing a navigable 6-foot channel also increase materially toward the lower end of the section.

In this section continuous shoal water extends for 1¾ miles below Swedesboro, and thence to Springers there are 14 detached shoals, all of which will require dredging.

The bottom in most cases is gravel, occasionally mixed with stones, sand, and some mud.

Springers wharf to the mouth.—In this section the low-water widths increase from 90 feet at Springers to 250 feet at the mouth, and the channel depths vary from 3 feet on Springers Bar to 9 feet at the mouth.

There are 9 shoals in this section on which the minimum low-water depth is 3.2 feet. This section includes Potato Hills Shoal and Springers Bar, at present the worst obstructions to general navigation on the stream.

The character of the material composing the shoals in this section varies considerably. Potato Hills Shoal is sandy. Between the bridges at Bridgeport the shoal is gravel, as is also the case at Grays, Kirbys, Schlags, and Justices. East of Devlins Island the shoal is sandy, while Springers Bar is composed of hard gravel mixed with clay.

The entrance of Raccoon Creek into the Delaware River is fair, and there is no bar, although a mud flat extending from the lower end of Tonkins Island slightly narrows the channel. It is protected on its lower side by a gravel jetty rising nearly to low water, formed during the progress of the improvement of Philadelphia Harbor, to prevent dredged material deposited in the Delaware River east of Marcushook Bar, from washing into the mouth of the creek.

The stream is crossed by five bridges between its mouth and Swedesboro: A county-road bridge and the Delaware River Railroad Bridge at Bridgeport, both with clear drawspan openings of 33 feet; a county-road bridge ¾ mile below Swedesboro, with a clear draw opening of 33 feet; the West Jersey and Seashore Railroad Bridge, just below Swedesboro, without a draw, but with a clear span of 25 feet and a height above high water of 18.6 feet, and a fixed highway bridge, limiting navigation, at Swedesboro.

The following plan for improvement is proposed:

The formation of a dredged channel 7 feet deep and 75 feet in width at mean low water, from the mouth, 1¾ miles to Bridgeport; thence a channel of the same depth and 60 feet in width to Springers wharf, and thence a channel 5 feet deep at mean low water and 40 feet in width to the head of navigation at Swedesboro, together with the widening of the channel around sharp bends. The limits of the proposed dredging are shown by broken black lines on the accompanying tracing.

The proposed improvement requires the removal of 371,400 cubic yards, place measurement, and, including contingencies, is estimated to cost $102,135, as follows:

	Cubic yards.	Cost.
Mouth to Bridgeport	68,800	$18,920
Bridgeport to Springers wharf	132,000	36,300
Springers wharf to Swedesboro	170,600	46,915
Total	371,400	102,135

The sum of $25,000 can be profitably expended in the first fiscal year.

Very respectfully, your obedient servant,

C. W. RAYMOND,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

I 15.

EXAMINATION AND SURVEY OF OLDMANS CREEK, NEW JERSEY.

[Printed in House Doc. No. 464, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, February 21, 1900.

SIR: I have the honor to submit herewith copies of reports dated April 18, 1899, and February 13, 1900, by Lieut. Col. C. W. Raymond, Corps of Engineers, upon preliminary examination and survey, respectively, of Oldmans Creek, New Jersey, made in accordance with the requirements of the river and harbor act of March 3, 1899.

The locality is deemed worthy of improvement by the United States, and Lieutenant-Colonel Raymond submits a plan for improvement by dredging across the neck of land separating the two streams a channel 6 feet deep at mean low water and 100 feet wide from the 6-foot contour in Delaware River one-fourth mile to the 6-foot contour in Oldmans Creek; thence a channel 6 feet deep with a width varying from 75 feet to 50 feet up to Pedricktown, a distance of 5½ miles; thence a channel 5 feet deep, with a width varying from 40 feet to 30 feet, for a distance of about 5 miles to just above Indian Run, and thence a channel 4 feet deep and 30 feet wide for a distance of 2¾ miles to Stowbridge's wharf in Auburn, which, together with the widening of the channel at sharp bends, the removal of overhanging trees, stumps, snags, etc., and the revetment of the channel at the mouth if necessary, it is estimated will cost, including contingencies, $60,000.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF OLDMANS CREEK, NEW JERSEY.

Engineer Office, United States Army,
Philadelphia, Pa., April 18, 1899.

General: In compliance with instructions contained in Department letters dated March 15 and April 14, 1899, I have the honor to submit the following report upon a preliminary examination of Oldmans Creek, New Jersey, in accordance with a provision of the river and harbor act of March 3, 1899.

A report upon a preliminary examination of this creek was submitted to the Department on November 16, 1896, in accordance with a provision of the river and harbor act of June 3, 1896. The present report is based upon data therein contained.

Oldmans Creek rises in Gloucester County, flows in a northwesterly direction, and enters the Delaware River about 3½ miles below a point opposite Marcushook, Pa. The head of navigation is at Auburn, where the stream is crossed by a highway bridge without a draw. At this point the width is 60 feet and the low-water depth 2 to 3 feet. Above Auburn the waterway rapidly decreases in width and depth, and becomes at Harrisonville, 2½ miles from Auburn by road, a mere brook, so obstructed by fallen trees and timber as to make its passage, even by a rowboat, impracticable.

From Auburn the stream winds through a valley, alternating between the fast land on either side, has numerous short bends, and gradually deepens and widens, until at Pedricktown, about 12 miles below, it has a width of 115 feet and a low-water depth of 6 to 8 feet.

The valley through which it flows has at Auburn a width approximating 600 feet, with high banks; this valley gradually widens and the banks decrease in height, until at Pedricktown the stream leaves the fast land entirely, and thence to the mouth, about 5 miles, runs through open meadows, lying 2 to 3 feet below high water, largely under cultivation, and protected from overflow by meadow banks which extend well up toward Auburn.

Below Pedricktown the stream widens to from 200 to 300 feet.

The prevailing low-water depths are—except on the bar and the shoals hereafter noted—3 to 8 feet from Auburn to Pedricktown, and thence to the mouth, 5 to 10 feet. The average rise and fall of tides are: At Auburn, 3½ feet (estimated); at Pedricktown, 5½ feet (estimated); at the bar, 6 feet (estimated).

The bottom is usually mud and sand with occasional gravel ridges. The only tributary of consequence is Beaver Creek, between Auburn and Pedricktown.

The stream is crossed by bridges as follows:

Kind of bridge.	Locality.	Length.	Clear bay of draw-span.
		Feet.	*Feet.*
Highway	Auburn	60	None.
Do	Pedricktown	100	30
Railroad	1½ miles below Pedricktown		*a* 42
Highway	3½ miles below Pedricktown	200	34

a Measured on line of railroad. Not at right angles to creek.

The high-water clearances vary from nothing at the railroad bridge, where the bottom of the draw truss is in the water, to about 4 feet at Pedricktown.

The principal obstructions to navigation are—

1. From Auburn to Pedricktown, six shoals, as follows, viz:

At Weatherbys or Currys Bar (formerly Horners), 1 mile below Auburn, a sand bar carrying 2½ feet at low water and having an estimated length of 200 feet. This bar was dredged many years ago by private parties.

At Englands Landing, about 1¾ miles below Auburn. This shoal is about the same as at Currys, except that it is composed of gravel and has a large rock in the center of the channel.

At Lynchs, or Lanes, there is a gravel bar approximating 200 feet in length, through which is a very narrow channel. Tugs can often pass this shoal, while loaded scows 21 feet wide, having the same draft as the tug, ground.

The "Graveyard," about 8 miles below Auburn. This is a gravel bar, estimated at 300 yards in length, which narrows the channel and reduces the available low-water depth to 2½ feet. This shoal is below a sharp bend which throws passing steamers on the bar.

At Weatherbys Lower Landing, 1 mile above Pedricktown, is a gravel bar carrying 3 feet at low water, with a length stated at 200 feet.

In the first reach above Pedricktown there is a gravel shoal estimated at 150 feet long, carrying 3 feet at low water.

2. Between Pedricktown and the mouth the obstructions are Pine Island and Hampton Shoals (both gravel ridges), a mud flat between Pedricktown and the railroad bridge, a shoal below the railroad bridge, and the bar at the mouth.

On the above shoals the depths vary from 2 to 3 feet. Their lengths vary from 50 to 150 yards.

On the bar the low-water depth varies between 2 and 3 feet, the channel following the New Jersey shore. The distance by the present channel between the 6-foot contour in the creek and the corresponding contour in the Delaware is about 1 mile. The creek's entrance into the river is a peculiar one, the channel running nearly parallel to the river for fully a mile and being separated from it by a low bar. The distance across this bar between the 6-foot contours is about 1,500 feet.

For purposes of commerce, the river is naturally divided into two sections, (1) from Pedricktown to the mouth, (2) from Auburn to Pedricktown.

Pedricktown is located about 5 miles above the mouth in the midst of a rich agricultural country, has a population of 800, one large gristmill, and the variety of general stores, blacksmith shops, etc., usual to a town of its size. It exports flour, feed, and produce, and imports coal, hay, manure, shells, lumber, and general merchandise.

Auburn has a population of 100, no factories, maintains 3 general stores, and derives its importance as a shipping point from the truck farms by which it is surrounded, these depending largely upon water transportation to Philadelphia, Chester, and Wilmington for a market. It exports truck, and imports coal, lumber, manure, and merchandise. Besides these principal points there are 13 farm landings.

From Auburn down commerce is carried on by a tug towing 2 scows with a capacity of 70 tons each, making 3 round trips weekly to Philadelphia during the trucking season, from July 15 to October 15 (at other seasons 2 round trips weekly), and the steam barge *Elsie Weatherby*, capacity 100 tons, towing 1 barge (capacity 70 tons), making 3 round trips during trucking season and running irregularly at other times. Besides these, there are other boats making 15 to 20 trips in and out during the trucking season, and occasionly schooners come up with salt hay. The *Weatherby* has a draft of 5½ to 6 feet, the tug 5 feet, and the loaded barges 5 to 6 feet. They work on the tide, leaving before high water so as to reach Pine Island and the bar at as nearly high water as possible.

From Pedricktown a tug and scow (capacity 150 tons) make 3 round trips to Philadelphia per week during trucking season; 1 steamer of 100 tons makes 3 round trips to Philadelphia during same season, and 1 steamer, *Mary E. Justice*, 70 tons, runs to Philadelphia, Wilmington, Chester, and other points all the year. These boats have a draft of from 5 to 6 feet. Besides these, there is an irregular commerce consisting of truck boats, canal boats in tow of tugs, small schooners, etc., bringing in hay, manure, and shells, and taking out produce. Canal boats, loaded, draw from 7 to 8 feet.

Boats leave Pedricktown about two hours before high water, so as to cross Pine Island and the bar on the top of the tide. This necessitates stemming the tide to Philadelphia.

The annual water commerce is estimated as follows:

Pedricktown to the mouth.—One hundred and sixteen steam and 117 sail vessels and barges; 22,875 tons of freight, valued at $242,545.

Auburn to the mouth.—One hundred and sixty steam and 200 sail vessels and barges; 18,745 tons of freight, valued at $115,709.

Summary.—Two hundred and seventy-six steam and 317 sail vessels and barges; 41,620 tons of freight, valued at $358,254.

The improvement asked for by shippers is the formation of a channel at least 6 feet deep and 100 feet wide across the bar, and the dredging of a similar channel 80 feet wide through the shoals as far up as Pedricktown; above Pedricktown the dredging of a channel 40 feet wide and 5 feet deep where needed.

The bar, Pine Island, and Hampton Shoals are the worst obstructions. Their removal would benefit the whole river, enabling shipments of perishable articles to be made without regard to tide, and would probably immediately increase the present water commerce from 30 to 50 per cent by diversions from the railroads.

The commercial interests which would be benefited by improving the stream are at present largely agricultural; manufacturers are barred off the stream on account of the poor entrance.

Full commercial statistics for the year ending October 1, 1896, compiled from statements submitted by leading shippers and merchants, are given in the Annual Report of the Chief of Engineers for 1897, page 1241.

In my opinion this creek is worthy of improvement by the General Government. The cost of a survey for the purpose of preparing a plan and estimate for its improvement is estimated at $500.

Very respectfully, your obedient servant,

C. W. Raymond,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Oldmans Creek, New Jersey.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

John C. Scofield,
Chief Clerk.

SURVEY OF OLDMANS CREEK, NEW JERSEY.

Engineer Office, United States Army,
Philadelphia, Pa., February 13, 1900.

General: In compliance with instructions contained in Department letter dated August 28, 1899, I have the honor to transmit herewith a tracing[1] of a survey of Oldmans Creek, New Jersey, made under my direction in accordance with the provision of the river and harbor act of March 3, 1899, by Mr. R. G. Pearson, United States surveyor, and also to submit the following project for improvement.

This creek rises in Gloucester County, N. J., flows generally in a northwesterly direction and enters the Delaware River about 3½ miles below a point opposite Marcushook, Pa. It is navigable at high water for a distance of 7 miles from the 6-foot curve in the Delaware River to Pedricktown for vessels of 8 feet draft; thence 4½ miles farther, to just above Ashcrafts wharf, for vessels drawing 7 feet; and thence 3½ miles farther to Auburn, the head of navigation, a draft of 5½ feet can be carried, except in the upper three-tenths of a mile, where an almost continuous shoal limits the high-water draft to about 4 feet. Above Auburn the stream is narrow and shoal.

The navigable portion of the first 2 miles below Auburn winds through a narrow valley covered with brush and trees and unprotected from overflow; from thence to the mouth the valley increases in width and consists of meadows lying 2 to 3 feet above low water and protected from overflow by earthen banks.

Navigation is much obstructed by bars, sharp bends, and in the upper portion of the stream by overhanging trees and submerged logs. The average range of tide at the confluence with the Delaware River is 6 feet; at Pedricktown, 7 miles above the 6-foot curve in the Delaware River, it is 4.9 feet; at Beaver Creek, 2 miles farther, it is 4.6 feet; at Lanes wharf, 12.7 miles above the 6-foot curve in the Delaware River, it is 3.5 feet; and at Auburn, 15 miles above the mouth, the average range of tide is about 3.2 feet. Low water occurs fifty-five minutes later at Pedricktown and two and one-fourth hours later at Auburn than at the mouth, and high water one and one-fourth and two and one-half hours later, respectively, at Pedricktown and Auburn. The average duration of the flood tide is five hours and ten minutes and of ebb tide six hours and thirty minutes.

The principal tributaries to Oldmans Creek are Indian Run and Beaver Creek. The former is a stream 60 feet wide and 2 feet deep at low water, joining Oldmans Creek on the east side about 4 miles below Auburn, while the latter, which has been cut off near the confluence by a dam and sluice, joins it on the west side about 2 miles above Pedricktown.

The stream is crossed by bridges as follows:

Kind of bridge.	Locality.	Length.	Clear bay of draw-span.
		Feet.	*Feet.*
Highway	Auburn	60	None.
Do	Pedricktown	100	30
Railroad	2 miles below Pedricktown		32
Highway	3¼ miles below Pedricktown	200	34

For navigation purposes the stream is divided into two sections:

1. From Auburn to Pedricktown, 8 miles.
2. From Pedricktown to the confluence, 7 miles.

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[1] Not printed.

AUBURN TO PEDRICKTOWN.

In this section, which has a length of 8 miles, the low-water widths vary from 30 feet at Auburn to 100 feet at Pedricktown, the corresponding distances between banks being 55 and 170 feet. The mean low-water channel depths vary from 1.4 feet at Auburn to 10 feet at Pedricktown. In the upper part of the section the channel is very narrow, much obstructed by overhanging trees, and quite shoal. The low-water channel has an average width of about 45 feet, while the low-water depths range generally from 2 to 5 feet, with occasional small holes at the bends, in which the depths are greater than 5 feet. In the lower part of the section the average low-water width increases to 65 feet, while the low-water depths increase from 5 to 10 feet. The 5-foot channel is almost continuous in the lower half of the section. In this section continuous shoal water extends for 1.5 miles below Auburn, and thence to Pedricktown there are 12 detached shoals, all of which will require dredging. The bottom in most cases is gravel, occasionally mixed with sand, stones, and some mud.

PEDRICKTOWN TO THE 6-FOOT CONTOUR IN THE DELAWARE RIVER.

In this section, which has a length of 7 miles, the low-water widths increase from 100 feet at Pedricktown to 230 feet just above the confluence, and the channel depths run generally from 5 to 12 feet. Exclusive of the bar at the confluence, there are 13 shoals in this section, the minimum low-water depth being 3.9 feet.

The entrance of Oldmans Creek into the Delaware River is a peculiar one, the creek flowing nearly parallel with the river for a distance of 3 miles and separated from it by a narrow point of land, the distance between the 6-foot contours in the creek and river across the neck near its lower end being about 1,000 feet. Below the point of land the creek spreads out over a shoal carrying a minimum low-water depth of 2.7 feet, and across which there is no defined channel. The bottom consists usually of mud and sand with some gravel.

The following plan for improvement is proposed:

The formation of a dredged channel 6 feet deep at mean low water and 100 feet in width from the 6-foot contour in the Delaware River one-fourth mile across the neck to the 6-foot contour in Oldmans Creek; thence to Pedricktown, a distance of 5½ miles, a channel 6 feet deep with a width varying from 75 feet to 50 feet; thence a channel 5 feet deep at mean low water with a width varying from 40 feet to 30 feet for a distance of about 5 miles to just above Indian Run; thence a channel 4 feet deep and 30 feet wide for a distance of 2¾ miles to Stowbridges wharf in Auburn, together with the widening of the channel at sharp bends and the removal of overhanging trees from the banks, and of stumps, snags, logs, or other obstructions which impede navigation, from the bed of the stream. It is proposed to form the channel at the mouth by dredging through the point of land above referred to just below the limiting line of high water, and to protect this channel, if necessary for its maintenance, by revetments on both sides. The location and extent of the dredging and revetments are shown on the accompanying tracing.

It is estimated that the proposed improvement will require the removal of 170,000 cubic yards of material, place measurement, and its cost, including revetments and contingencies, is placed at $60,000, as follows:

	Miles.	Cubic yards.	Cost.
From 6-foot contour in Delaware River to 6-foot contour in Oldmans Creek	¼	55,000	$12,100
2,000 feet of revetment	....	....	19,800
From 6-foot contour in Oldmans Creek to Pedricktown	5½	74,000	16,280
From Pedricktown to just above Indian Run	5	18,000	3,960
From just above Indian Run to Stowbridges wharf, Auburn	2¾	23,000	5,060
Removal of overhanging trees, stumps, logs, and other obstructions	....	....	2,800
Total	13½	170,000	60,000

The entire improvement can be profitably executed in one year.

Very respectfully, your obedient servant,

C. W. RAYMOND,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

I 16.

EXAMINATION AND SURVEY OF MAURICE RIVER, NEW JERSEY.

[Printed in House Doc. No. 344, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, January 25, 1900.

SIR: I have the honor to submit herewith copies of reports of June 8, 1899, and January 16, 1900, with map,[1] by Lieut. Col. C. W. Raymond, Corps of Engineers, upon preliminary examination and survey, respectively, of Maurice River, New Jersey, made to comply with the requirements of the river and harbor act of March 3, 1899.

The plan of improvement proposed by Lieutenant-Colonel Raymond contemplates the formation of a dredged channel 7 feet deep at mean low water and 100 feet wide at bottom from below Frenchs Bar, 3.5 miles, to South Millville; thence 7 feet deep and 75 feet wide, seven-eighths mile farther, to the center of R. D. Wood & Co.'s wharf at Millville; and thence 6 feet deep and 60 feet wide, one-fourth mile farther, to the head of navigation, together with the widening of the channel at bends; the dredged channels to be protected in wide reaches, where necessary, by revetment walls. The estimated cost of this work is $98,000.

In the opinion of the local officer, the locality is worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

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[1] Not reprinted. Printed in House Doc. No. 344, Fifty-sixth Congress, first session.

PRELIMINARY EXAMINATION OF MAURICE RIVER, NEW JERSEY.

ENGINEER OFFICE, UNITED STATES ARMY,
Philadelphia, Pa., June 8, 1899.

GENERAL: In compliance with instructions contained in Department letter dated March 15, 1899, I have the honor to submit the following report on a preliminary examination of Maurice River, New Jersey, made in accordance with a provision of the river and harbor act of March 3, 1899.

This river rises in Gloucester County, and is one of the largest streams in southern New Jersey; its drainage area comprises about 400 square miles, covering the greater part of Cumberland County, with portions of the surrounding counties of Salem, Gloucester, and Atlantic. It enters Delaware River through Maurice River Cove, at a point 19 miles above Cape May.

The head of steam navigation is at Millville, N. J., 24 miles above the mouth, at a point where the stream is crossed by a footbridge, about 3,500 feet above the Millville Bridge. A short distance above the footbridge the stream is dammed and converted into a lake of about 800 acres in extent, which affords water power to various local industrial establishments.

From Millville, the course of the stream to Mauricetown, 12 miles above the mouth, is approximately a southeasterly one. It winds its way between the fast land on either side through a valley of low meadows lying 2 to 3 feet below high water and generally embanked. In this distance it has three tributaries, viz, Buckshutem, Manantico, and Elizabeth creeks.

From Mauricetown to the mouth the general direction of flow is southwesterly, and lies almost entirely through low meadows, more or less embanked, as far down as Port Norris; these meadows become salt about 5 miles above the mouth. Fast land is left at Port Norris, 3 miles above the mouth.

The stream is crossed by bridges as follows:

Location.	Kind of bridge.	Clear width of span.
		Feet.
Millville	Highway	41.5
Mauricetown	do	58

This stream was surveyed in 1881, and a project for its improvement was submitted February 3, 1892. (See Annual Report of the Chief of Engineers for 1882, p. 809.) The project provided for the formation, by dredging, of a low-water channel 100 feet wide and 6 feet deep from a point about 4 miles below Millville to Millville Bridge, and a channel of the same width and 4 feet deep above the bridge to the head of navigation.

The project was modified in 1890 so as to provide for the extension of the 6-foot channel from Millville to the head of navigation; and again in 1892 so as to provide for the further extension of the 6-foot channel with a width of 50 feet for a distance of 500 feet farther upstream, and for slight local improvements of the channel below Millville. The project was completed in 1892 at a total cost of $43,000, giving a channel with a minimum depth of 6 feet from the bar to the head of navigation. In its original condition the channel of the river had a natural mean low-water depth of from 10 to 40 feet from the bay to a point 4 miles below Millville, a distance of about 20 miles, except upon the bar at the mouth, where the depth was 5 feet. The remainder of the river to the head of navigation, a distance of about 4½ miles, was quite shoal, with depths varying from 2 to 10 feet.

A recent examination of the whole river shows that for the entire distance formerly under improvement the dredged cuts have shoaled so that the present low-water depths are 2 feet at the head of navigation, about 4 feet at Frenchs Bar, and the average depth is about 5 feet through the reach. The remainder of the river to the mouth has depths varying from 10 to 40 feet, and the low-water depth on the bar remains at about 5 feet.

At Millville the low-water width is about 120 feet. For 4 miles below Millville the high and low water widths were formerly very irregular, but they were regulated during the progress of the improvement by the deposit of dredged material as artificial banks. Many of these banks are now badly eroded. In the lower section of the river the low-water widths vary from 500 to 1,000 feet, becoming 1,600 feet at the mouth.

The obstructions to navigation are at present the bar at the mouth, across which the channel has a length of fully 2 miles, and the shoal water extending from Frenchs Bar, which is about 4 miles below Millville, to the head of navigation at Millville.

The range of tide was determined during the survey of 1881 as 6.1 feet at the mouth, diminishing to 5.2 feet at Millville. This permits a draft across the bar at high water of about 9 to 10 feet, which draft can be carried to within 4 miles of Millville; thence the draft becomes reduced to about 7 to 9 feet.

The principal towns located along the stream are Millville, Port Elizabeth, Leesburg, Bricksboro, Mauricetown, Port Norris, Bivalve, and Maurice River Station.

Millville in 1890 had a population of 10,466 (now considerably larger), and has from 200 to 250 places of business and 8 manufactories producing glass, iron pipe, and cotton goods.

Millville exports sand, gravel, wood, and iron pipe, and imports coal, lumber, grain, salt hay, shells, oysters, brick, pig iron, etc.

This commerce is carried on as follows:

First. By about 6 steamers, with a draft of 5 to 9 feet and a maximum capacity of 350 tons, making irregular trips to Philadelphia, Baltimore, and Wilmington, about 200 round trips during the year.

Second. By sailing vessels having a maximum draft of 12 feet and plying between Millville and northern and southern coast ports. These vessels can not, on account of shoal water at and below Millville and on the bar, load to their full draft. Their capacities vary from 300 to 500 tons. Nine of these vessels are owned in Millville. The total number of trips of sailing vessels during the past year is estimated at 252.

Third. By barges and canal boats having a draft of 5 to 6 feet, with capacities of 100 to 500 tons, towed by tugs. A tug is maintained at Millville for towing purposes.

Mauricetown, Leesburg, Port Elizabeth, and Bricksboro are towns of about 600 to 1,000 population each and of relatively small commercial importance. Port Norris, Bivalve, and Maurice River Station are all located together, about 3 miles from the mouth, Port Norris having a population of over 1,500. Two railroads center here for the handling of the oyster traffic coming in over the bar. About 450 vessels known as oyster boats, with capacities of from 5 to 20 tons each, are employed in this trade. These vessels average 31,570 trips per year and are estimated to carry 154,300 tons of oysters for shipping and planting purposes. The value of the oyster traffic for 1898 is estimated at $1,145,025. The oysters are shipped by rail to Philadelphia, New York, and other points.

In addition to the above towns there are several farm landings and sand and brick wharves at various points along the river. About 1 mile above Port Norris there is a menhaden factory, employing 2 steamers of about 80 tons each, making altogether 240 trips per year. At Port Norris the railroad company maintains a tugboat for ferry purposes. Boats usually time their departure so as to pass the shoal water below Millville and the bar at high water.

The annual water commerce is estimated as follows:

Millville to the mouth.—Four hundred and nine steamers, 252 sailing vessels, and 244 canal boats and barges; 178,293 tons of freight, valued at $871,782.

Port Norris to the mouth.—Three hundred and five steamers, 100 sailing vessels, 31,570 oyster boats, 7 barges and canal boats; 165,050 tons of freight, valued at $1,216,875.

Summary.—Seven hundred and fourteen steamers, 352 sailing vessels, 251 barges and canal boats, 31,570 oyster boats; 343,343 tons of freight, valued at $2,088,657.

The improvement asked for by shippers is the formation of a channel 100 feet wide and 7 feet deep at mean low water from the head of navigation at Millville to deep water below Frenchs Bar, and the improvement of the channel across the bar, these constituting the only present obstructions.

The improvement of the bar would be very costly and require the diking and dredging of over 2 miles of channel. This work is not considered as justified at present by the amount and character of commerce.

The shoal water at and below Millville, however, is a detriment to the commerce of the town, and the deepening of the channel through it to a depth of 7 feet at low water would afford great relief and probably result in a large increase of water carriage.

Full commercial statistics for the year ending December 31, 1898, compiled from statements submitted by the United States Fish Commission, leading shippers, and merchants and owners of boats, are appended to this report.

In my opinion the stream is worthy of improvement by the General Government at and below Millville. The cost of a survey for the purpose of preparing a plan and estimate for its improvement is placed at $600.

Very respectfully, your obedient servant,

C. W. Raymond,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First Indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Maurice River, New Jersey.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

COMMERCIAL STATISTICS.

Maurice River, New Jersey, for the year ending December 31, 1898.

VESSEL STATEMENT.

Kind of vessel.	Number.	Tonnage.	Arriving	Departing.
MILLVILLE TO MOUTH.				
Steamers	409	63,185	409	409
Sailing vessels	252	34,095	252	252
Barges and canal boats	244	77,720	244	244
PORT NORRIS TO MOUTH.				
Steamers	305	33,000	305	305
Sailing vessels	100	10,000	100	100
Barges and canal boats	7	1,750	7	7
Oyster boats	31,570	315,700	31,570	31,570
Total steamers	714	96,185	714	714
Total sailing vessels	352	44,095	352	352
Total barges and canal boats	251	79,470	251	251
Total oyster boats	31,570	315,700	31,570	31,570
Aggregate	32,887	535,450	32,887	32,887

FREIGHT STATEMENT.

Articles.	Arriving.		Departing.	
	Tons.	Value.	Tons.	Value.
MILLVILLE TO MOUTH.				
Manure	100	$200		
Coal	14,000	44,100		
Lumber	8,000	64,000		
Grain	5,250	115,550		
Salt hay	6,240	31,200		
Shells	250	875		
Oysters	1,700	22,500		
Sand			53,600	$80,400
Gravel			56,250	84,375
Wood			3,000	12,000
Brick	4,300	18,834		
Iron pipe			11,314	226,280
Pig iron	13,289	159,468		
Building stone	1,000	12,000		
Total	54,129	468,727	124,164	403,055

FREIGHT STATEMENT—Continued.

Articles.	Arriving.		Departing.	
	Tons.	Value.	Tons.	Value.
PORT NORRIS TO MOUTH.				
Coal	2,500	$10,000		
Lumber	2,000	8,000		
Grain	1,000	22,000		
Salt hay	500	3,000	1,000	$6,000
Shells	1,750	5,850		
Oysters	154,300	1,145,025		
Fish	2,000	17,000		
Total	164,050	1,210,875	1,000	6,000

TOTAL COMMERCE.

	Arriving.		Departing.	
	Tons.	Value.	Tons.	Value,
From Millville	54,129	$468,727	124,164	$403,055
From Port Norris	164,050	1,210,875	1,000	6,000
Total	218,179	1,679,602	125,164	409,055

	Tons.	Value.
Arriving	218,179	$1,679,602
Departing	125,164	409,055
Total	343,343	2,088,657

SURVEY OF MAURICE RIVER, NEW JERSEY.

ENGINEER OFFICE, UNITED STATES ARMY,
Philadelphia, Pa., January 16, 1900.

GENERAL: In compliance with instructions contained in Department letter dated August 28, 1899, I have the honor to transmit herewith a tracing of a survey of a part of Maurice River, New Jersey, made under my direction in accordance with a provision of the river and harbor act of March 3, 1899, by Mr. R. G. Pearson, United States surveyor, and also to submit the following project for improvement:

In my report dated June 8, 1899, on the preliminary examination of this river, the part of the stream at and below Millville was recommended as worthy of improvement. The survey extends from Millville to deep water below Frenchs Bar, a distance of about 4⅝ miles, and covers all the shoal water at and below Millville. No survey was made of the bar.

Maurice River is one of the largest streams in southern New Jersey. It rises in Gloucester County, and below Millville flows southeasterly and southwesterly, entering Delaware Bay through Maurice River Cove at a point about 19 miles above Cape May. It has a drainage-area of about 400 square miles. After crossing the bar, which carries a low-water depth of about 5 feet, the stream is navigable at high water for a distance of 19½ miles above its mouth to just below Frenchs

Bar for vessels of 15 feet draft; thence 3½ miles farther to South Millville for vessels drawing 10 feet; thence seven-eighths mile to the center of R. D. Wood & Co.'s wharf at Millville for vessels drawing 9 feet; and thence one-fourth mile farther to the head of navigation at Millville, which is a light wooden footbridge less than one-fourth mile below a high dam across the river, a high-water draft of 8 feet can be carried.

From Millville to Frenchs Bar the stream is fairly straight and runs through a narrow valley of low marshes, lying 2 to 3 feet below high water and generally embanked. At Millville, above the highway bridge, the stream has a mean low-water width of from 75 to 120 feet and a prevailing mean low-water depth of 3.5 feet. Its width is contracted by wharves on the east side and a spoil bank, the result of former dredging, on the west side. Below the Millville Bridge to Frenchs Bar the low-water widths vary from 90 to 450 feet and are very irregular. The prevailing mean low-water depth on the shoals is from 4 to 5 feet.

The tidal range at and below Millville was found to be uniform and equal on an average to 6.2 feet. Low tide occurs two and one-half hours and high tide two and three-fourths hours later at Millville than at Lewes, Del.

Both flood and ebb currents are very sluggish, although the latter is perceptibly the stronger and varies with the issue of water from the sluices at the Millville Dam.

The stream within the limits of the survey is crossed by a highway bridge at Millville with a clear draw opening of about 40 feet.

At present navigation is much obstructed by the shoal water at Frenchs Bar and by the almost continuous shoal water from the bend above Keys wharf to the head of navigation at Millville. The bottom is usually sand and and gravel.

The following plan of improvement is proposed:

The formation of a dredged channel 7 feet deep at mean low water and bottom width of 100 feet from below Frenchs Bar 3½ miles to South Millville; thence a channel of the same depth and bottom width of 75 feet seven-eighths of a mile farther to the center of R. D. Wood & Co.'s wharf at Millville; and thence a channel 6 feet deep at mean low water and bottom width of 60 feet one-fourth mile farther to the head of navigation, together with the widening of the channel at bends, the dredged channels to be protected in wide reaches, where necessary, by revetment walls. The limits of the proposed dredging and the revetment walls are shown on the accompanying tracing.

It is proposed to deposit the dredged material on the banks of the stream, in the river in deep holes below Frenchs Bar, and behind the revetment walls, as may be practicable, and the estimate of cost is based on this probable disposition of material.

In a former improvement of this stream the narrowing of the low-water widths where they were excessive was considered necessary for the maintainance of the dredged channels, but the present survey shows that the plan of effecting this by the deposit of dredged material alongside the dredged cuts as training walls without a protecting revetment was not successful.

It is estimated that the proposed improvement will require the removal of 275,000 cubic yards of material, place measurement, and the construction of 5,700 linear feet of revetment wall, at a cost, including contingencies, of $98,000, as follows:

	Miles.	Cubic yards.	Cost.
From below Frenchs Bar to South Millville, including 5,700 linear feet of revetment wall	3¼	193,000	$80,000
From South Millville to center of R. D. Wood & Co.'s wharf	⅞	67,000	14,700
From center of R. D. Wood & Co.'s wharf to head of navigation	¼	15,000	3,300
Total	4⅜	275,000	98,000

The entire improvement can be profitably executed in one year.

Very respectfully, your obedient servant.

C. W. Raymond,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

I 17.

EXAMINATION AND SURVEY OF TUCKERTON CREEK, NEW JERSEY.

[Printed in House Doc. No. 274, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, January 9, 1900.

Sir: I have the honor to submit herewith copies of reports, dated April 18, 1899, and January 3, 1900, by Lieut. Col. C. W. Raymond, Corps of Engineers, upon preliminary examination and survey, respectively, of Tuckerton Creek, New Jersey, made to comply with the requirements of the river and harbor act of March 3, 1899.

Colonel Raymond considers the locality to be worthy of improvement by the General Government, and he submits a plan for improvement which contemplates the dredging of a channel 6 feet deep at mean low water and 80 feet wide from Gaunts Point seven-eighths of a mile to the mouth of the creek; thence a channel of the same depth and 75 feet wide 1 mile to Parkers Landing; thence a channel of same depth and 60 feet wide five-eighths of a mile farther to West Tuckerton Landing; thence a channel 5 feet deep at mean low water and 60 feet wide for three-eighths of a mile to just above Scow Landing; and thence a channel 3 feet deep at mean low water and 40 feet wide for one-eighth of a mile to the mill dam at Tuckerton, together with the widening of the channel at sharp bends, the channel across the cove between the mouth of the creek and Oyster Bed Point to be supplemented, if necessary, by a revetment wall along its northern side. The estimated cost of the work, including contingencies, is $61,380.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF TUCKERTON CREEK, NEW JERSEY.

ENGINEER OFFICE, UNITED STATES ARMY,
Philadelphia, Pa., April 18, 1899.

GENERAL: In compliance with instructions contained in Department letters dated March 15 and April 14, 1899, I have the honor to submit the following report upon a preliminary examination of Tuckerton Creek, New Jersey, in accordance with a provision of the river and harbor act of March 3, 1899.

A report upon a preliminary examination of this creek was submitted to the Department on November 16, 1896, in accordance with a provision of the river and harbor act of June 3, 1896. The present report is based upon data therein contained.

Tuckerton Creek flows into Little Egg Harbor. The head of navigation is at the town of Tuckerton, about 2 miles from the mouth. The range of the tide is from 2½ to 3 feet. The creek has an average width of about 75 feet and a least width of 50 feet. At Tuckerton there is a mean low-water depth of 15 inches, this being the minimum depth in the stream. The average depth is about 20 inches. It is reported that the depth was formerly much greater, but that shoaling has been in progress during recent years, due probably in part to sawdust from lumber mills, which are now abandoned. At the mouth there is a depth of 4 feet, but the flats beyond it carry only from 2 to 2½ feet at low water. Beyond the flats there is a depth of from 6 to 10 feet to the ocean through New Inlet.

Tuckerton is a town of 1,400 inhabitants and has been a port of entry for over one hundred years, but has no longer any foreign commerce. The principal industry is the oyster and clam trade, which is large annd steadily increasing. During the year 1895 the oysters and clams brought up the creek and sent to market by rail amounted to 10,986,610 pounds, valued at $130,000. From 90 to 100 boats are now engaged in this trade. Large quantities of fish scrap, used in the manufacture of fertilizers, are shipped from this locality. Hay and produce are also shipped, and there is a small business in fishing and the construction of boats.

The improvement desired is the dredging of a channel from the upper landing in Tuckerton to Gaunts Point, a distance of 2¾ miles. It is proposed to give the channel a bottom width of 75 feet, a depth of 5 feet at mean low water from the upper landing to the lower landing, 400 yards below, and a depth of 6 feet at mean low water from the lower landing to Gaunts Point. It is said that this improvement will make it possible to use larger vessels in the oyster trade, as was done before the creek shoaled, and to construct ways for their repair; that the packing houses can be located higher up the stream; that vessels will not be detained while awaiting a favorable tide, and that steam communication between Tuckerton, Beach Haven, Atlantic City, and other points will be much facilitated.

In view of the benefits to commerce which would probably result from the work proposed, I am of the opinion that this creek is worthy of improvement by the General Government. The cost of a survey for the preparation of a project and estimate will not exceed $400.

Very respectfully, your obedient servant,

C. W. RAYMOND,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Tuckerton Creek, New Jersey.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF TUCKERTON CREEK, NEW JERSEY.

ENGINEER OFFICE, UNITED STATES ARMY,
Philadelphia, Pa., January 3, 1900.

GENERAL: In compliance with instructions contained in Department letter dated August 28, 1899, I have the honor to transmit herewith a tracing[1] of a survey of Tuckerton Creek, New Jersey, made under my direction in accordance with a provision of the river and harbor act of March 3, 1899, by Mr. R. G. Pearson, United States surveyor, and also to submit the following project for improvement:

This creek lies wholly in Burlington County, N. J., flows southeasterly, and empties into Little Egg Harbor, on the New Jersey coast.

It is navigable at high water for a distance of 1⅝ miles above its mouth to West Tuckerton Landing for vessels of 4½ feet draft; thence one-fourth mile farther to Scow Landing for vessels drawing 4 feet, and thence one-fourth mile farther to the head of navigation just below the milldam in Tuckerton a draft of 2½ feet can be carried.

The stream, after leaving the fast land at Tuckerton, meanders through salt meadows in short reaches and enters the bay through a cove. The channel through the cove follows the north shore and has a low-water depth of about 3 feet at the mouth of the creek, gradually deepening to about 6 feet at Gaunts Point, seven-eighths of a mile below, where this depth prevails for a long distance from shore. At Tuckerton the stream has an average low-water width of 60 feet and a low-water depth of 2 feet, increasing to 75 feet width and 2.5 feet depth at Parkers Landing, 1⅛ miles below the milldam, and to 150 feet width and 3 feet depth at the mouth.

The tidal range throughout the creek is about 2.5 feet. There are no bridges.

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[1] Not printed.

At present navigation is much obstructed by the shoalness of the water throughout the entire creek and cove and by a few sharp bends.

The bottom is usually mud, with some sand and gravel at Tuckerton, but there are no special shoals.

The following plan of improvement is proposed:

The formation of a dredged channel 6 feet deep at mean low water and 80 feet wide from Gaunts Point seven-eighths mile to the mouth of the creek; thence a channel of the same depth and 75 feet wide for 1 mile to Parkers Landing; thence a channel of the same depth and 60 feet wide five-eighths mile farther to West Tuckerton Landing; thence a channel 5 feet deep at mean low water and 60 feet wide for three-eighths mile to just above Scow Landing, and thence a channel 3 feet deep at mean low water and 40 feet wide for the remaining one-eighth mile to the milldam at Tuckerton, together with the widening of the channel at sharp bends; the channel across the cove between the mouth of the creek and Oyster Bed Point to be supplemented, if necessary, by a revetment wall along its northern side. The limits of the proposed dredging and of the revetment wall are shown by the broken black lines on the accompanying tracing.

It is proposed to deposit the dredged material on the banks of the stream, behind the revetment wall, and along the north side of the channel as may be practicable, and the estimate of cost is based on this probable disposition of material.

It is estimated that the proposed improvement will require the removal of 236,500 yards, place measurement, and its cost, including contingencies, is estimated at $61,380, as follows:

	Miles.	Cubic yards.	Cost.
From Gaunts Point through the cove to the mouth of the creek	⅞	49,500	$10,890
Revetment wall, 1,700 linear feet			9,350
From mouth of creek to Parkers Landing	1	94,500	20,790
From Parkers Landing to West Tuckerton Landing	⅝	60,500	13,310
From West Tuckerton Landing to just above Scow Landing	⅜	26,000	5,720
From just above Scow Landing to head of navigation	⅛	6,000	1,320
Total	3	236,500	61,380

The entire improvement can be profitably executed in one year.

Very respectfully, your obedient servant,

C. W. Raymond,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

I 18.

DELAWARE RIVER FROM PHILADELPHIA, PENNSYLVANIA, TO DEEP WATER IN DELAWARE BAY.

[Printed in House Doc. No. 91, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 17, 1899.

Sir: In the item making an appropriation, act of March 3, 1899, for improving Delaware River from Trenton to its mouth, Congress authorized the appointment by the Secretary of War of a Board of three engineers to make a further examination of the project and report such modification of the same as may be deemed desirable, with estimate of cost.

Under this provision of law a Board was appointed, and I have now the honor to submit the accompanying copy of its report of September 8, 1899, together with copy of my letter of September 18, and indorsement thereon by the Secretary of War, and beg leave to suggest that these papers be transmitted to the Speaker of the House of Representatives for the information of the Committee on Appropriations and the Committee on Rivers and Harbors.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

LETTER OF THE CHIEF OF ENGINEERS, UNITED STATES ARMY.

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, September 18, 1899.

SIR: The river and harbor act approved March 3, 1899, contains an appropriation of $300,000 for improving Delaware River from Trenton to its mouth, a portion of which sum is, under the terms of the law, available for obtaining a channel 600 feet wide and 30 feet deep from Christian street in Philadelphia to deep water in Delaware Bay, in accordance with the report printed in House Doc. No. 219, Fifty-fifth Congress, second session, or such modified project as shall be recommended by a Board of Engineers and approved by the Secretary of War, provided the total cost of the work shall not be increased thereby. The act further provides that the Secretary of War may enter into contract or contracts for such materials and work as may be required for prosecuting such improvement, not to exceed in the aggregate $500,000, to be paid for as appropriations may from time to time be made by law, and authorizes him to appoint a Board of three engineers to make a further examination of the project and report such modification of the same as may be deemed desirable, with an estimate of the cost.

The Board thus provided for was constituted by the appointment of Lieut. Col. G. J. Lydecker, Lieut. Col. C. W. Raymond, and Maj. William H. Bixby, Corps of Engineers, and I have now the honor to submit the accompanying report of September 8 by this Board upon the subject it has had under consideration.

The location of the channel proposed by the Board is shown on the accompanying tracing, and the estimated cost of securing a channel of the dimensions named in the act is $5,810,000—an amount some $6,000 less than the estimate of cost presented in the report published in the document mentioned in the act.

The question of disposing of the very large amount of dredged material to be removed is one which has received consideration by the

Board, and in the preparation of estimates it was assumed that all soft material is to be placed above high water or in inclosed basins specially prepared for its reception, but it is thought that there are localities near the shores in the lower part of the river and in the upper part of the bay where a large amount of the dredged material could be deposited without danger to the channel or serious injury to the fishing interests.

The Board recommends the formation of an island opposite Reedy Island by inclosing the area between Baker Shoal and Stony Point Shoal and filling the interior with dredged material. Such an island would furnish a place of deposit for about 21,700,000 cubic yards of material, and would exert an important influence in maintaining the channel at this location, where excessive width causes persistent shoaling.

The Board is of opinion that the improvement of the channel should first be made where it will be of the greatest and most immediate benefit to navigation, and it accordingly recommends that the expenditure now authorized below Christian street, Philadelphia, be applied to the improvement of subsection B of section 1 (from just above Stony Point to Elsingboro Point), and to the construction of a part of the bulkhead required for the formation of the proposed basin for the reception of dredged material.

The views of the Board, are, in my judgment, judicious, and I recommend that the report be approved, and that I be authorized to direct Lieutenant-Colonel Raymond, the officer in local charge of the improvement, to prepare a project in accordance therewith for application of funds made available by the last river and harbor act for this work.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

[First indorsement.]

War Department,
September 20, 1899.

Approved as within recommended by the Chief of Engineers.

Elihu Root,
Secretary of War.

REPORT OF BOARD OF ENGINEERS UPON PROJECT FOR OBTAINING A CHANNEL 600 FEET WIDE AND 30 FEET DEEP IN DELAWARE RIVER FROM CHRISTIAN STREET, PHILADELPHIA, PA., TO DEEP WATER IN DELAWARE BAY.

Engineer Office, United States Army,
Philadelphia, Pa., September 8, 1899.

General: The Board of Officers of the Corps of Engineers constituted by Special Orders, No. 16, headquarters Corps of Engineers, United States Army, March 20, 1899, in accordance with the provisions of the river and harbor act of March 3, 1899, to make a further examination of the project for improving the Delaware River from Trenton to its mouth, and report such modifications as may be deemed desirable, with an estimate of the cost, has the honor to submit the following report:

The provisions of the act above referred to, with reference to this improvement, are as follows:

> Improving Delaware River from Trenton to its mouth, Pennsylvania and New Jersey: Continuing improvement, three hundred thousand dollars, of which the Secretary of War may use so much as may, in his opinion, be required between Trenton and Christian street in Philadelphia, and the balance shall be available for obtaining a channel six hundred feet wide and thirty feet deep from said Christian street to deep water in Delaware Bay, in accordance with the report printed in House Document Number Two hundred and nineteen, Fifty-fifth Congress, second session, or such modified project as shall hereafter be recommended by a board of engineers and approved by the Secretary of War: *Provided*, That the total cost of the work shall not be increased thereby: *And provided further*, That the Secretary of War may enter into contract or contracts for such materials and work as may be required for prosecuting such improvement, not to exceed in the aggregate five hundred thousand dollars, to be paid for as appropriations may from time to time be made by law. The Secretary of War is hereby authorized to appoint a board of three engineers to make a further examination of the project and report such modification of the same as may be deemed desirable, with an estimate of the cost, the expense of such examination to be paid from the appropriation herein made.

Under these provisions the Board understands its duties to be limited to an examination of and report upon a project for obtaining a channel 600 feet wide and 30 feet deep from Christian street in Philadelphia to deep water in Delaware Bay, and accordingly improvements which may be desirable between Christian street and Trenton are not considered in this report.

The Board convened at the United States engineer office, at Philadelphia, Pa., on April 10, 1899, and read and discussed the report upon the proposed improvement of the Delaware River, printed in House Doc. No. 219, Fifty-fifth Congress, second session. On April 10, 11, and 12 the Board made an examination of the river from Philadelphia to its mouth, traversing the entire length of the channel on the engineer steamer *Vidette*. The Board then resumed its deliberations at the engineer office at Philadelphia, and having ascertained that changes have occurred in some parts of the channel since the submission of the report of January 5, 1898, requested the district engineer to procure such additional information and surveys as were deemed essential to the preparation of a project and estimate in accordance with the conditions existing at the present time. The Board adjourned on April 13, to reassemble in Philadelphia as soon as this information could be obtained.

The Board reassembled at the United States engineer office at Philadelphia on September 7, 1899, and, after full consideration of the new surveys and information submitted by the district engineer, unanimously adopted this report and adjourned on September 8, 1899.

PROJECT FOR THE IMPROVEMENT.

The report of January 5, 1898, which is referred to in the act of March 3, 1899, was submitted in compliance with a provision of the river and harbor act of June 3, 1896, which directed a survey of the Delaware River, with a view to obtaining a channel 600 feet wide and 30 feet deep from a point at or near the city of Philadelphia to the deep water of Delaware Bay. The project for the formation of such a channel is found in the report under the head of "Cost of forming the channel." It gives the approximate location and estimated cost of a channel of the required dimensions from a point a little below

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Bombay Hook to Christian street, Philadelphia, a distance of about 56 miles. Above and below the points mentioned there is now a channel depth of at least 30 feet below mean low water.

For the purpose of convenient investigation and for the formation of estimates, the channel to be improved is divided into nine sections, which are numbered consecutively from the head of the bay to Philadelphia. These sections are shown on the accompanying map.

PLACES OF DEPOSIT.

The project contemplates the excavation of a very large amount of material, the greater part of which is of such a character as to be readily moved by the currents. The Board concurs in the opinion expressed in the report of 1898 that such material should generally be deposited in the bay beyond the limits of the river proper, or placed in inclosed basins or on shore above high water. The locality in the bay suggested in the report of 1898 as the nearest and best dumping ground for such excavated material as can not be conveniently deposited on shore is the deep hole just below Ben Davis Point Shoal, 6 miles below Ship John Light, where a very large amount of material could be deposited without possibility of injury to any navigable channel. It was supposed that such deposits at this place would not interfere with riparian or fishing interests, but it has been recently learned that this locality contains beds of seed oysters, which are of great value in connection with the Maurice Cove oyster fisheries and which would be seriously injured by dumping soft material upon them.

There are, however, localities near the shores in the lower part of the river and in the upper part of the bay where a large amount of dredged material could be deposited without danger to the channel or serious injury to the fishing interests. The Board is of the opinion that the deposit of material at such places should be authorized, when approved by the engineer officer in charge; but in view of the probability of conflict with riparian and fishing interests the Board considers it best, in the preparation of estimates, to assume that all soft material is to be placed above high water or in inclosed basins specially prepared for its reception.

The Board recommends the formation of an island opposite Reedy Island, in section 1, by inclosing the area between Baker Shoal and Stony Point Shoal and filling the interior with dredged material. Such an island would furnish a place of deposit for about 21,700,000 cubic yards of material, place measurement, and would exert an important influence in maintaining the channel, as will be explained hereafter. The form and location of the proposed island are shown on the accompanying map.[1]

About 1,500,000 cubic yards of dredged material could be deposited to advantage upon low areas of the Government reservation at forts Delaware, Mott, and DuPont, and, if necessary, inclosed basins of very large capacity can be constructed on the shoals above and below Pea Patch Island.

There are many low places along the shores of the Delaware River where material can be deposited above high water with great benefit to the property of private riparian owners. Special attention is invited to the suggestion made in the report of 1898 that the Delaware shore above the jetty at the mouth of the Christiana River be advanced by bulkheading and filling in with dredged material. This would greatly improve the conditions for the maintenance of the channel, and the city of Wilmington would thereby obtain a magnificent water front on the improved channel of the Delaware River. About 700 feet of the necessary bulkhead should be built at the expense of the United States, as it will lie in front of Government property which will be increased in area by the filling. The Board is informed that the riparian owners will probably be willing to construct the remainder at their own expense. This locality would furnish a place of deposit for about 5,000,000 cubic yards of dredged material.

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[1] Not reprinted. Printed in House Doc. No. 91, Fifty-sixth Congress, first session.

In the selection of places for the deposit of dredged material the Board is of the opinion that the engineer officer in charge should be given a large discretion, and that lower prices for the work will be obtained if the contractors are authorized to deposit material for the improvement of private riparian property whenever they find it to their advantage. The construction and filling of the proposed island opposite Reedy Island should, however, be made obligatory, since it is considered necessary for the maintenance of the improved channel.

Hard material, such as rock, bowlders, and gravel, can be readily and advantageously disposed of by depositing it in deep holes in the channel or along the faces of bulkheads and dikes.

ESTIMATES OF COST.

The location for the improved channel shown on the accompanying map has been adopted as the basis of estimates, and has been selected to correspond to conditions now existing; but special attention is invited to the fact that the bed of the river is constantly undergoing change, and therefore the Board is of the opinion that the exact location of each part of the channel to be improved should be so determined by the engineer officer in charge during the progress of the work, as to conform to the conditions existing at the time the work is executed.

The estimated cost of the improvement has been determined for each section separately, as follows:

Section 1—Bombay Hook to Elsingboro Point.—This section is subjected to the inflow of water from the bay during the period of the flood tide, and it contains the shoals which constitute the bar above the mouth. The maintenance of an improved channel in this locality will doubtless be more difficult and uncertain than in any other part of the river.

The project for improvement recommended by the Board of Engineers of 1885 proposed the construction of extensive dikes on the right bank of the river above Bombay Hook Light and between Liston Point and Reedy Island (see Annual Report of the Chief of Engineers for 1885, Appendix G, p. 828). Under this project dikes were commenced at Reedy Island and Liston Point, but they were not sufficiently extended to produce decided effects, owing to the objections of persons interested in the navigation of small streams entering the river on the Delaware shore.

The Board of Engineers of 1896 recommended the abandonment of dikes for the improvement of this section, and the formation of the channel by dredging from deep water at the head of the bay to deep water above Dan Baker Shoal (see Annual Report of the Chief of Engineers for 1897, p. 1203).

In accordance with this project the channel was dredged in 1897 to a minimum depth of 26 feet at mean low water over a width varying from 400 to 600 feet, 3,400,000 cubic yards of material, scow measurement, being removed. When the report of 1898 was submitted, sufficient time had not elapsed to determine the question of the permanency of this improvement. Surveys of this section, made during the present season at the request of the Board, show that the increased depth has been well maintained from the head of the bay upstream for a distance of about 9 miles, but that above these limits shoaling has been rapid and extensive over a distance of about 2 miles. It is therefore desirable to divide this section into two parts—subsection A, extending from Bombay Hook to just above Stony Point, and subsection B, extending thence to Elsingboro Point—the improvement of which may be considered separately. The subsections are indicated on the accompanying map.

Subsection A.—The Board is of the opinion that the improved channel can probably be maintained without excessive dredging, and that dike construction is not at present advisable.

In the report of 1898 the channel was located along the line of greatest depth, so as to require the least dredging, and to conform as far as possible to the existing range line. The Board recommends that the channel be located farther to the westward, as shown on the accompanying map. This change is made to conform to a new location of the channel in subsection B, to be described hereafter. This new location will increase the amount of dredging and require a change in the position of the lights of the Port Penn range, but it is much better for the purposes of navigation and channel maintenance.

The estimated quantity of material to be removed is 8,277,000 cubic yards, scow measurement. The cost is estimated at 9 cents per cubic yard, scow measurement.

The total cost of forming the channel in this subsection is estimated at $744,930.

Subsection B.—The persistent shoaling which has occurred in the channel in this subsection, between Reedy Island and just above Stony Point is due to the excessive width and area of cross section of the waterway, and to the direction of the flood current, which crosses the channel, and the direction of the ebb. These defects could be corrected by constructing the dike from Reedy Island to Liston Point, as recommended by the Board of Engineers of 1885, but this would probably be injurious to the local navigation interests of the Delaware shore and its tributary streams. The Board therefore recommends the formation of an island east of that part of the channel where shoaling occurs, the form and location of which are shown on the accompanying map. This island has been designed so as to reduce the cross-sectional areas of the improved waterway to about what they should be to conform to the cross-sectional areas above Reedy Island and below Stony Point, and so as to deflect more of the ebb current into the improved channel. This island will greatly improve the conditions for channel maintenance and will furnish a much-needed place for the deposit of dredged material. It may be found necessary in the future to do some dike construction on the west side of the channel in order to deflect the flood current, but this is not recommended at the present time.

From the results of recent surveys the Board is of the opinion that the lower part of the channel should be located farther to the westward, as shown on the accompanying map. The upper part of the channel has also been relocated to conform to existing conditions, which will require the relocation of the Finns Point range lights.

The cost of the bulkhead for the formation of the island is estimated at $324,000.

The estimated quantity of material to be removed is 4,293,000 cubic yards, scow measurement. The cost is estimated at 9 cents per cubic yard, scow measurement.

The total cost of forming the channel in this subsection, including the cost of the bulkhead, is estimated at $710,370.

Section 2—Elsingboro Point to Fort Delaware.—The location of the channel, which has been slightly changed from that adopted in the report of 1898 to conform to existing conditions, is shown on the accompanying map.

The estimated quantity of material to be removed is 2,688,000 cubic yards, scow measurement. The cost is estimated at 12 cents per cubic yard, scow measurement.

The total cost of forming the channel in this section is estimated at $322,560.

Section 3—Fort Delaware to Deep Water Point.—The Board approves the location of the channel adopted in the report of 1898, which is shown on the accompanying map. The estimated quantity of material to be removed is 3,869,000 cubic yards, scow measurement. The cost is estimated at 14½ cents per cubic yard, scow measurement.

The total cost of improving the channel in this section is estimated at $561,005.

Section 4—Deep Water Point to Oldmans Point.—The Board approves the location of the channel adopted in the report of 1898, which is shown on the accompanying map. The estimated quantity of material to be removed is 5,506,000 cubic yards, scow measurement. The cost of dredging is estimated at 15½ cents per cubic yard, scow measurement. The cost of a bulkhead in front of the Government property at the mouth of the Christiana River is estimated at $7,000.

The total cost of improving the channel in this section, including the cost of the bulkhead, is $860,430.

Section 5—Oldmans Point to Marcushook.—The Board approves the location of the channel adopted in the report of 1898, as shown on the accompanying map. The estimated quantity of material to be removed is 4,176,000 cubic yards, scow measurement. The cost is estimated at 18 cents per cubic yard, scow measurement.

The total cost of improving the channel in this section is estimated at $751,680.

Section 6—Marcushook to head of Chester Island.—The Board approves the location of the channel adopted in the report of 1898, as shown on the accompanying map. In addition to the dredging of loose material, the improvement of this section requires the excavation of a large amount of ledge rock. When the report of 1898 was submitted, part of this rock was being removed under a contract with the Philadelphia department of public works. This work has recently been completed, and the Board is indebted to the courtesy of the city engineer for a detailed survey showing the present condition of the rock surface. The estimates of quantities now submitted are based upon the information thus obtained.

The estimated quantity of ledge rock to be removed is 24,000 cubic yards, place measurement. The estimated quantity of material to be dredged, consisting of bowlders, gravel, sand, and mud, is 2,889,000 cubic yards, scow measurement.

The Board is of the opinion that the cost of this work should not exceed $8 per cubic yard, place measurement. The total cost of rock removal in this section is estimated at $192,000.

The cost of dredging is estimated at 18 cents per cubic yard, scow measurement. The total cost of dredging in this section is estimated at $520,020.

The total cost of forming the channel in this section is estimated at $712,020.

Section 7—Head of Chester Island to head of Tinicum Island.—The Board approves the location of the channel adopted in the report of 1898, as shown on the accompanying map. The estimated quantity of material to be removed is 1,480,000 cubic yards, scow measurement.

The cost is estimated at 19 cents per cubic yard, scow measurement.

The total cost of forming the channel in this section is estimated at $281,200.

Section 8—Head of Tinicum Island to Eagle Point.—The Board approves the location of the channel adopted in the report of 1898, as shown on the accompanying map. When that report was submitted the channel in this section was being improved by the city of Philadelphia. This work has since been completed and the channel surveyed. The estimate now submitted is based upon the latest surveys.

The estimated quantity of material to be removed is 1,256,000 cubic yards, scow measurement. The cost is estimated at 19 cents per cubic yard, scow measurement.

The total cost of forming the channel in this section is estimated at $238,640.

Section 9—Eagle Point to Christian street, Philadelphia.—The Board approves the location recommended in the report of 1898, as shown on the accompanying map. The estimated quantity of material to be removed is 519,000 cubic yards, scow measurement. The cost is estimated at 19 cents per cubic yard, scow measurement.

The total cost of forming the channel in this section is estimated at $98,610.

Estimated cost of the improvement.

Section.	Dredging, cubic yards, scow measurement.	Cost.	Rock removal, cubic yards, place measurement.	Cost.
1	12,570,000	a $1,455,300		
2	2,688,000	322,560		
3	3,869,000	561,005		
4	5,506,000	a 860,430		
5	4,176,000	751,680		
6	2,889,000	520,020	24,000	$192,000
7	1,480,000	281,200		
8	1,256,000	238,640		
9	519,000	98,610		
Total	34,953,000	5,089,445	24,000	192,000

a Includes cost of bulkhead.

Cost of dredging	$5,089,445
Cost of rock removal	192,000
	5,281,445
Engineering and contingencies	528,555
Total	5,810,000

The cost of the entire improvement, as estimated in the report of 1898, omitting the cost of rock removal opposite Petty Island, which has been otherwise provided for, was $5,816,000. Therefore the total cost of the work will not be increased by the modifications herein recommended; and in this connection the Board desires to state that the unit prices adopted for work covered by its estimates are believed to be very liberal ones.

COMMENCEMENT OF THE WORK.

The river and harbor act of March 3, 1899, authorizes the Secretary of War to enter into contract or contracts for such materials and work as may be required for prosecuting this improvement, not to exceed in the aggregate $500,000, to be paid for as appropriations may from time to time be made by law. The amount thus provided will cover the cost of only about one-twelfth of the entire improvement, and it is therefore important to determine to what part of the project it can be devoted to the best advantage. The Board is of the opinion that the improvement of the channel should be first made where it will be of the greatest and most immediate benefit to navigation. The shoal in the channel just below Reedy Island is now the most troublesome obstruction to the navigation of the river. The Board accordingly recommends that the expenditure now authorized be applied to the improvement of subsection B of section 1, and to the construction of a part of the bulkhead required for the formation of the proposed basin for the reception of dredged material. The channel should be excavated to a full depth of 30 feet at mean low water, with a width as great as can be formed with the funds available, not exceeding 600 feet, and so much of the bulkhead should be constructed as is necessary to form a basin for the deposit of the material so excavated.

Respectfully submitted,

G. J. Lydecker,
Lieut. Col., Corps of Engineers.
C. W. Raymond,
Lieut. Col., Corps of Engineers.
W. H. Bixby,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

APPENDIX J.

IMPROVEMENT OF RIVERS AND HARBORS IN DELAWARE, IN MARYLAND EAST OF CHESAPEAKE BAY, AND OF INLAND WATERWAY FROM CHINCOTEAGUE BAY TO DELAWARE BAY, VIRGINIA, MARYLAND, AND DELAWARE.

REPORT OF GEN. WM. F. SMITH, UNITED STATES AGENT, MAJOR OF ENGINEERS, UNITED STATES ARMY, RETIRED, IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Wilmington Harbor, Delaware.
2. Appoquinimink River, Delaware.
3. Smyrna River, Delaware.
4. Murderkill River, Delaware.
5. Mispillion River, Delaware.
6. Broadkill Creek, Delaware.
7. Inland waterway from Chincoteague Bay, Virginia, to Delaware Bay, at or near Lewes, Del.
8. Susquehanna River above and below Havre de Grace, Md.
9. Rockhall Harbor, Maryland.
10. Queenstown Harbor, Maryland.
11. Chester River, Maryland, from Crumpton to Jones Landing.
12. Choptank River, Maryland.
13. La Trappe River, Maryland.
14. Warwick River, Maryland.
15. Nanticoke River, Delaware and Maryland.
16. Broad Creek River, Delaware.
17. Wicomico River, Maryland.
18. Manokin River, Maryland.
19. Pocomoke River, Maryland.
20. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEYS.

21. St. Jones River, Delaware.
22. Elk River, Maryland.
23. Rockhall Harbor, Maryland.
24. Queenstown Harbor, Maryland.
25. Claiborne Harbor, Maryland.
26. Tyaskin (Wetipquin) Creek, Maryland.
27. Channel to Tangier Island, Tangier Sound, Virginia.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., July 18, 1900.

GENERAL: I have the honor to transmit herewith the annual report for the works of river and harbor improvement in my charge for the fiscal year ending June 30, 1900.

Very respectfully, your obedient servant,

WM. F. SMITH,
United States Agent.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

J 1.

IMPROVEMENT OF WILMINGTON HARBOR, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 208.

The amount expended for the improvement of the Christiana River and Wilmington Harbor to June 30, 1899, was $453,552.62, of which $51,357.84 was expended on the present project.

The dredging in progress at the close of last fiscal year was continued under the contracts in force at close of fiscal year 1899, until January 23, 1900, when the contractors' dredge was withdrawn for repairs and alterations and remained away from the work until March 5, 1900, when dredging by it was resumed and continued until March 23, when it was again withdrawn, this time from the district. No other dredge was put in its place on these occasions. The dredging was then again resumed on June 19 and continued to the end of the fiscal year. These interruptions delayed the work considerably. The past winter was, generally speaking, a favorable one for dredging in the Christiana River. On April 30, 1900, the contractors were granted until June 1 to resume dredging, all the work under their contracts to be completed not later than August 1 next, and later some further time was granted to enable them to get ready.

To the close of the fiscal year 1900 the channel had been dredged to a width of 200 feet and a depth of 18 feet at mean low water from that depth in the Delaware River to the upper line of the pulp works, a distance of 21,298 feet, thence gradually diminishing to a depth of 10 feet at the Philadelphia, Wilmington and Baltimore Railroad Bridge No. 4, and thence for a distance of 11,300 feet to a width of 100 feet and a depth of 7 feet at mean low water, with exceptions as follows: Through the south draw of the Market Street Bridge the required channel had been dredged, but that through the north draw remained incomplete, owing to the delays of the contractors and to the hardness of the material at the bottom, with which the dredges so far engaged in the work have been able to make but little progress. At all the bridges the width of the channel in the approaches and through them has been made to conform to the lines of the structures and the width of the draw openings.

At the Third Street Bridge the channel through the left draw is somewhat obstructed by a city water main, which slopes from 0 to 6 feet inshore above the 18-foot depth on the bed of the river. This is to be lowered shortly to a depth of 25 feet below mean low water by the city authorities.

Authority having been granted for the same, a supplemental contract was made with John J. Fitzpatrick on September 16, 1899, for removing rock from the ledges at the Third Street Bridge at the price of his original contract, i. e., $7.13 per cubic yard in place, the depth to be made 21½ feet at mean low water, the additional one-half foot being required to safely carry a draft of 21 feet. Under this contract and the others previously made an area of 7,640 square feet on the upper ledge previously drilled and blasted to 18 feet was made 21½ feet deep, and on the lower ledge an area of 6,785 square feet, or that portion of this ledge not blasted last year, was blasted to a depth of 18 feet, and later an area of 9,835 square feet was blasted to a depth of 21½ feet at mean low water. The quantity of broken rock removed and redeposited during the year is 3,635 cubic yards measured in place.

The river and harbor act of March 3, 1899, appropriated $45,000 for continuing the improvement and authorized contracts to be made for completing it in accordance with the project submitted by the Board of Engineers in its report of October 3, 1896, including the removal of rock, as recommended in the Annual Report of the Chief of Engineers for 1897.

To carry out the provisions of this law, plans were prepared for the work stated below, and, after approval, contracts were made after due advertisement, and work done thereon as follows:

Benjamin T. Collins, of Milford, Del., for the construction of a pile and stone jetty at the mouth of the Brandywine, 560 feet long, consisting of two wings, one extending from the shore of the Brandywine above the mouth and the other from the Christiana River shore just above the point of junction with the Brandywine, the two following curved lines meeting in a common tangent. This was completed on April 30, 1900. The contract price was $7,310.80.

With Benjamin T. Collins, dated November 11, 1899, for construction of a pile and stone jetty 1,515 feet long, on the south side of the mouth of Christiana River, with a cross dike 1,170 feet long from the inner end of the jetty to the shore at high-water line. This work was begun on April 28, 1900, and is progressing favorably. The contract price is $33,512, and the work is to be completed in one hundred and eighty working days from January 8, 1900.

With Sanford & Brooks Company, of Baltimore, Md., dated November 18, 1889, for the repair and extension of the jetty on the north side of the mouth of the river and the construction of a terminal crib. The plan of this extension carries the jetty to the 18-foot curve so as to make the currents of the Delaware and Christiana rivers parallel at their junction, the length being 313 feet, or 9 feet less than was contemplated in the project approved by the Department in 1884. This work was begun April 23, 1900, and is progressing favorably. The price is $31,100, and the work is to be completed in two hundred working days from December 12, 1899.

For the dredging required to complete the project to a 21-foot depth, contract was made with the Bowers Hydraulic Dredging Company, of Camden, N. J., at 10⅞ cents per cubic yard, place measurement. The contract provides for beginning the work on or before March 1, 1900, but the contractors did not begin until June 25, and the work done to the end of the month was only the dredging of a cut 50 feet wide and 1,100 feet long from the Philadelphia, Wilmington and Baltimore Railroad cut-off bridge No. 4, working downstream, in which section the depth increases from 10 feet at the upper end to 21 feet at the pulp works.

Soundings recently made show the condition of the channel as follows, the depth given being at mean low water: At the outer end of the north jetty at the mouth of the Christiana River there was a depth of 14 feet for a width of about 150 feet; 1,130 feet up the river the depth was 18 feet for a width of 110 feet and 15 feet for a width of 150 feet; a half mile farther up the depth was 18 feet for a width of 110 feet and 15 feet for a width of 160 feet; 2,500 feet farther up (abreast of the Merchants' Transportation Company's wharf) the depth was 12½ feet for a width of 150 feet and 15 feet for a width of 40 feet; through the draws of the Philadelphia, Wilmington and Baltimore Railroad cut-off bridge No. 3 the depth was 18 feet; at the mouth of the Brandywine the depth was 15 feet and over for a width of 90 feet;

opposite the Atlantic Refining Company's property there was a depth of 18 feet and over for a width of 50 feet and 15 feet for a width of 110 feet; at the Jackson & Sharp Company's upper yard a depth of 15 feet and over for a width of 130 feet; opposite the Pusey & Jones Company's railway 14 feet for a width of 160 feet; through the south draw of Market Street Bridge for a width of 70 feet the depth was 15 feet and over, the maximum depth being 19 feet for a few feet in width in the center; at Harlan & Hollinsworth's dry dock there was a depth of 15½ feet for a width of 130 feet; at the old Walton & Whann Company's wharf the depth was 14½ feet for a width of 100 feet, and at the upper end of the pulp works the depth was 16 feet and over for a width of 120 feet.

These soundings are selected from the chart with the view of showing the general condition of the channel. Below the Philadelphia, Wilmington and Baltimore Railroad cut-off bridge No. 3 the channel was dredged to 18 feet deep at mean low water between December, 1898, and May, 1899; above that bridge to the Market Street Bridge to 18 feet between May and September, 1899, except about 1,000 feet below the Third Street Bridge, abreast of Jackson & Sharp's, which was done in December, 1899, and above Market Street Bridge the 18-foot depth was made between September, 1899, and January, 1900.

This shows that the channel has narrowed and shoaled very much indeed. The maximum draft that can be carried June 30, 1900, at mean low water, over the shoalest part of the river is 14 feet for a width of 100 feet. The contract of the Bowers Hydraulic Dredging Company now in operation requires the dredging of this channel to a depth of 21 feet, and with the increased depth and cross section the rate of shoaling will be even greater, the extent of which can be determined only upon the completion of the work. No reliable estimate of the cost of maintaining the channel or suggestions regarding measures for its protection can be given at this time.

The important commercial, manufacturing, and shipbuilding interests of Wilmington warrant liberal expenditures in making and maintaining a proper channel.

It is proposed to expend the amount asked for for maintenance or in redredging where necessary, as far as it will go.

Wilmington is a port of entry and in the collection district of Delaware. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $23,031.

Money statement.

July 1, 1899, balance unexpended		$199,488.16
Amount appropriated by sundry civil act approved June 6, 1900		200,000.00
		399,488.16
June 30, 1900, amount expended during fiscal year		118,265.64
July 1, 1900, balance unexpended		281,222.52
July 1, 1900, outstanding liabilities	$3,000.00	
July 1, 1900, amount covered by uncompleted contracts	278,222.52	
		281,222.52
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement		50,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

AMOUNTS APPROPRIATED.

By act approved—		
July 14, 1836		$15,000
March 3, 1837		8,000
July 7, 1838		9,356
July 11, 1870		15,000
June 10, 1872		10,000
March 3, 1873		6,000
June 23, 1874		6,000
March 3, 1875		10,000
August 14, 1876		16,000
June 18, 1878		7,000
March 3, 1879		3,500
June 14, 1880		10,000
March 3, 1881		50,000
By act passed August 2, 1882		50,000
By act approved—		
July 5, 1884		25,000
August 5, 1886		18,750
By act of August 11, 1888		30,000
By act approved—		
September 19, 1890		30,000
July 13, 1892		40,000
By act of August 18, 1894		25,000
By act of June 3, 1896		20,000
		404,606
By act approved—		
July 1, 1898	$205,846	
March 3, 1899	45,000	
June 6, 1900	200,000	
		450,846
Aggregate		855,452

Of the above the sum of $2,411.22 has been carried to the surplus fund of the Treasury.

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened October 19, 1899, for the construction of a jetty at the mouth of the Brandywine River, Delaware.

No.	Name and address of bidder.	Time to—		Price.
		Commence (days after award).	Complete (days).	
1	B. F. Sweeten & Son, Camden, N. J	60	120	$7,534.00
2	Delaware Construction Co., Wilmington, Del	10 days, and money is available.	100	9,000.00
3	Philadelphia Construction Co., Philadelphia, Pa	30	180 working days.	16,000.00
4	Benjamin T. Collins, Milford, Del	60	120	7,310.80
5	American Artificial Stone Pavement and Construction Co., Philadelphia, Pa.	30	100	9,500.00
6	Franklin K. Mills, Wilmington, Del	30	75	8,202.89
7	Sanford & Brooks Co., Baltimore, Md	30	200 working days.	7,900.00
8	P. Sanford Ross, Incorporated, Jersey City, N. J	Apr. 1, 1900	June 30, 1901.	[a]6,950.00

[a] This proposal is conditional upon acceptance of his bids for mouth of Christiana River.

Contract made with Benjamin T. Collins.

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened October 19, 1899, for the construction of a jetty with cross dike at the mouth of the Christiana River, on the south side, Delaware.

No.	Name and address of bidder.	Jetty.		Cross dike.		Total for jetty and cross dike.	Time to—	
		Per linear foot.	Total.	Per linear foot.	Total.		Commence (days after award).	Complete (days).
1	B. F. Sweeten & Son, Camden, N. J.	$19.96	$30,239.40	$3.34	$3,907.80	$34,147.20	60	120
2	Delaware Construction Co., Wilmington, Del.	23.10	34,996.50	5.98	6,996.60	[a]42,000.00	10, and money is available.	100
3	Frank Pidgeon, Saugerties, N. Y.	24.35	36,890.25	7.00	8,190.00	45,080.25	30	October, 1900.
4	Philadelphia Construction Co., Philadelphia, Pa.	30.36	45,995.40	4.28	5,007.60	[a]51,000.00	30	300 working days.
5	Benjamin T. Collins, Milford, Del.	20.00	30,300.00	3.60	4,212.00	[a]33,512.00	60	180
6	American Artificial Stone Pavement and Construction Co., Philadelphia.	26.25	39,768.75	3.00	3,510.00	[a]43,000.00	30	150
7	Sanford & Brooks Co., Baltimore, Md.	20.50	31,057.50	2.20	2,574.00	33,631.50	30	200 working days.
8	P. Sanford Ross, Incorporated, Jersey City, N. J.	20.45	30,981.75	2.86	3,346.20	[b]34,327.95	Apr. 1, 1900	June 30, 1901.

[a] These are the totals given in the proposals.
[b] This proposal is conditional upon acceptance of bids of same party for Brandywine and north side jetties.

Contract made with Benjamin T. Collins.

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened October 19, 1899, for the repair and extension of the jetty at the mouth of the Christiana River, on the north side, and the construction of a terminal crib.

No.	Name and address of bidder.	With crib on stone base.				With crib on stiff mud.		Time to—	
		Repairs.	Extension.	Crib.	Total.	Crib.	For entire work.	Commence.	Complete.
1	B. F. Sweeten & Son, Camden, N. J.	$4,236	$16,250	$8,390	$28,876	$15,000	$35,486	60 days after award.	120 days.
2	Delaware Construction Co., Wilmington, Del.	7,583	15,911	7,000	30,494	16,000	39,494	10 days after award and money is available.	180 days.
3	Frank Pidgeon, Saugerties, N. Y.	5,500	20,800	8,300	34,600	7,900	[a]34,200	30 days after award.	October, 1900.
4	Sanford & Brooks Co., Baltimore, Md.	4,500	20,700	5,900	[a]31,100	7,000	31,100	30 days after award.	200 working days.
5	P. Sanford Ross, Incorporated, Jersey City, N. J.	8,000	18,700	11,675	[b]38,375	....	....	April 1, 1900	June 30, 1901.

[a] Total at the unit prices; total not stated in proposal.
[b] Conditional upon acceptance of the bids of the same party for the Brandywine and south jetties.

Contract made with the Sanford & Brooks Company for the work, with crib on hard bottom (gravel), at $31,100.

Abstract of proposals for dredging in Wilmington Harbor and Christiana River, Delaware, received by Gen. William F. Smith, United States agent, and opened October 19, 1899.

No.	Name and address of bidder.	Time to— Commence.	Time to— Complete.	Price per cubic yard, place measurement.
				Cents.
1	American Dredging Co., Philadelphia, Pa.	On or before March 1, 1900.	On or before June 30, 1901.	11 4
2	Bowers Hydraulic Dredging Co., Camden, N. J.	do	do	10⅞
3	Atlantic, Gulf and Pacific Co., New York	100 days after award.	As required by specifications.	13.8

Bid of Bowers Hydraulic Dredging Company accepted.

Abstract of contracts in force, with names of contractors, etc.

Contracts.	Names of contractors.	Date of approval.	Date of— Beginning work.	Date of— Expiration.
For dredging to depth of 18 feet mean low water, 2 contracts.	New York Dredging Co., New York.	Nov. 10, 1898, and Jan. 9, 1899.	Dec. 19, 1898	Aug. 1, 1900, as extended.
For dredging to depth of 21 feet mean low water.	Bowers Hydraulic Dredging Co., Camden, N. J.	Dec. 15, 1899	June 25, 1900	June 30, 1901.
For rock removal to depth of 21 feet mean low water, 3 contracts.	John J. Fitzpatrick, Plattsburg, N. Y.	Nov. 1, 1898, and May 9 and Oct. 4, 1899.	Dec. 8, 1898	Oct. 1, 1900.
Construction of jetty and cross dike, mouth of Christiana River, south side.	Benjamin T. Collins, Milford, Del.	Dec. 7, 1899	Apr. 28, 1900	180 working days from Jan. 8, 1900.
Repair and extension of north jetty and construction of terminal crib, mouth of Christiana River.	Sanford & Brooks Co., Baltimore, Md.	Dec. 5, 1899	Apr. 23, 1900	200 working days from Dec. 12, 1899.

COMMERCIAL STATISTICS OF THE CITY OF WILMINGTON FOR THE CALENDAR YEAR 1899.

[Furnished by the Wilmington Board of Trade.]

The tonnage and value of leading articles shipped to and from the port of Wilmington by water during the year 1899 are as follows:

DOMESTIC COMMERCE.

Articles.		Quantity.	Value.
Coal	tons	42,000	$105,975
Cord wood	do	4,500	17,900
Quarry stone	do	82,575	196,575
Sand, building and molding	do	50,275	26,975
Ice	do	3,135	5,825
Powder	do	2,995	210,725
Fertilizers	do	19,975	125,240
Iron supplies and steel	do	56,995	1,035,990
Lumber, sawed	do	25,230	201,125
Machinery	do	20,115	185,925
Cement	do	5,525	49,235
General merchandise	do	142,675	17,321,550
Miscellaneous and unclassified	do	200,875	7,745,350
Total	do	656,870	27,228,390

FOREIGN COMMERCE.

Articles.	Quantity.	Value.
Imports:		
Iron ore ....tons..	5,756	$7,375
Phosphate rock ....do....	2,325	1,401
Nitrate of soda ....do....	7,547	146,220
Cornwall stone ....do....	903	5,058
Scrap iron ....do....	1,899	13,814
Total ....do....	21,430	173,868
Exports:		
Barrel materials ....tons..	79	4,500
Machinery ....do....	15	6,000
Naphtha ....gallons..	1,753,000	110,600
Crude oil ....do....	70,680,000	3,361,000
Refined oil ....do....	20,939,423	1,201,639
General merchandise ....tons..	635	7,300
Total ....do....	....	4,691,039
Total foreign imports and exports	....	4,864,907

There were engaged in foreign petroleum trade to and from this port (Marcushook) 33 steamers, making each a trip in about every six weeks, and of a total registered tonnage of 63,287. These statistics relative to foreign commerce were furnished by Hon. William H. Cooper, collector of the port.

Vessels trading in Wilmington Harbor not included above.

Class.	Number.	Aggregate tonnage.	Draft.
			Feet.
Steamers	5	1,670	6 to 10
Tugs	10	540	4 to 8
Schooners	12	678	....
Barges	20	9,205	....
Total	47	12,093	....

The above vessels are engaged in daily river and harbor work. In addition, there are numerous vessels of all classes engaged in general coastwise trade, of which no distinct record is kept. There passed in and out of this port during 1899 996 steamers, barges, tugs, schooners, vessels, and floats laden with merchandise or for repairs not including our regular lines of daily connections.

There is invested in freight and passenger lines between Wilmington, Del., and Philadelphia, Pa., and Pennsgrove, N. J., over $1,000,000. These vessels carry annually 530,000 passengers and freight valued at $16,500,000.

There is invested in manufacturing and mercantile interests on the Christiana River, all dependent upon the facilities of this river navigation, about $15,000,000.

The following statistics of vessels built and repaired at Wilmington, Del., were furnished by the Harlan & Hollingsworth Company, the Pusey & Jones Company, and the Jackson & Sharp Company. These statistics are not complete.

Vessels built.

Class.	Number.	Aggregate tonnage.	Draft.
			Feet.
Steamers, steel	2	5,200	13
Do	2	7,000	11½
Do	1	1,771	8½
Do	1	340	6½
Steam yachts, steel	2	239	7
Tugboat, wood	1	95	....
Elevator hulls, wood	3	1,050	....
Dump scows, wood	3	1,850	....
Derrick lighters, wood	3	850	....
House boats, wood	2	600	....
Grain barge, wood	1	1,000	....
Car float, wood	1	1,340	....
Total	22	21,335	....

Vessels repaired.

Class.	Number.	Average tonnage.	Draft.
			Feet.
Steamers	345	66,113	
Sailing vessels	48	19,202	
Total	393	85,315	

J 2.

IMPROVEMENT OF APPOQUINIMINK RIVER, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 211.

The amount expended on this improvement to the close of the fiscal year 1899 was $19,976.68.

For the expenditure of the $5,000 provided by the river and harbor act of March 3, 1899, contract was made, after due advertisement, with the River and Harbor Improvement Company for dredging at 12 cents per cubic yard, place measurement. Under this contract dredging was begun on April 19 and completed June 2, 1900. During this period the two cut-offs at Thomas Landing, the upper one about 650 feet long and the lower one about 800 feet long, were dredged to a width and depth of not less than 80 feet and 8 feet at mean low water, respectively; at the mouth of the river the cut across the marsh was widened to 100 feet, the depth made being not less than 5 feet at mean low water, and at Toms Bay a cut 380 feet long was made through a sharp turn in the river, the width and depth made being not less than 35 feet and 6 feet at mean low water, respectively. The result of these operations is a good, safe channel through the cut-offs and across the bar at the mouth. The quantity of material removed was 37,596 cubic yards, and consisted of mud and sand, with some clay. The material from the cut-offs at Thomas Landing and the cut at the mouth was deposited in the reaches of the river rendered useless by the cut-offs, and the material from the cut at Toms Bay was deposited on the adjacent marshes above high water.

The maximum draft that can be carried, June 30, 1900, at mean low water over the shoalest part of the river is 6 feet.

It is proposed to spend the amount asked for, if appropriated, in continuing work under the project.

The work is in the collection district of Delaware. Wilmington is the nearest port of entry, and the amount of revenue collected there during the fiscal year ending June 30, 1900, is $23,031.

Money statement.

July 1, 1899, balance unexpended		$5,023.32
June 30, 1900, amount expended during fiscal year		4,935.39
July 1, 1900, balance unexpended		87.93
Amount (estimated) required for completion of existing project		14,963.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$6,000.00	
For maintenance of improvement	2,000.00	
		8,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved September 19, 1890	$5,000
By act approved July 13, 1892	5,000
By act of August 18, 1894	5,000
By act of June 3, 1896	5,000
By act approved March 3, 1899	5,000
Total	25,000

Abstract of proposals received by Gen. William F. Smith, United States agent, for dredging in Murderkill, Smyrna, and Appoquinimink rivers, Delaware, and opened July 10, 1899.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.		
1	River and Harbor Improvement Co., Camden, N. J.	12	Aug. 15, 1899; capacity, 800 yards daily.	June 30, 1900
2	John L. Mills, Camden, N. J	12	On approval of contract; capacity, 1,000 yards daily.	Do.
3	James H. Egan, Charleston, S. C	13	Aug. 1, 1899	Do.
4	Delaware Construction Co., Wilmington, Del	13	Aug. 30, 1899; capacity, 500 yards daily.	July 1, 1900
5	American Dredging Co., Philadelphia, Pa	15	July 15, 1899	June 30, 1900

Contract made with the River and Harbor Improvement Company, after successfully drawing lots with John L. Mills therefor.

No contracts in force at present.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Coal, fertilizers, flour, etc	8,925	$167,125
Horses, potatoes, etc	1,075	58,375
General merchandise	4,250	637,500
Total	14,250	863,000
Shipments:		
Canned goods	1,300	85,300
Fruit, wheat, poultry, sheep, etc	7,365	557,250
General merchandise	275	41,250
Total	8,940	684,800
Total receipts and shipments	23,200	1,547,800

Vessels trading in Appoquinimink River, Delaware.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamer	1	136	7	Semiweekly.
Tugs	3	104	6 to 7	Transient.
Schooners	2	150		Transient, grain.
Barges	3	750		Transient, coal, etc.
Total	9	1,140		

The above statistics were furnished by Mr. F. B. Watkins, Odessa, Del.

J 3.

IMPROVEMENT OF SMYRNA RIVER, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 212.

The amount expended on this improvement to June 30, 1899, was $37,995.49, of which amount $27,995.49 is on the present project.

For the expenditure of the appropriation made by the river and harbor act of March 3, 1899, contract was made, after due advertisement, with the River and Harbor Improvement Company, for dredging at the price of 12 cents per cubic yard, place measurement; and under this contract the channel was dredged between December 29, 1899, and February 14, 1900, to a width of 60 feet and a depth of 7 feet at mean low water through shoals at Walravens, Beaver House Reach, Rothwells Landing, and Deep Hole Reach, an aggregate length of 2,565 feet, and a continuous stretch of 5,210 feet from Walravens Point upstream, resulting in a channel of the project dimensions from the upper terminus to the bar at the mouth, with a turning basin at Smyrna Landing. The quantity of material removed was 32,640 cubic yards, and was mainly blue mud. That removed at Lime Kiln, Beaver House Reach, Rothwells, and Deep Hole included some sand, gravel, and clay, and all was deposited upon the banks of the river above high water at distances ranging between 20 and 75 feet back.

This leaves the shoal at the bar at the mouth to be removed to complete the dredging.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part of the river to the bar at the mouth is 7 feet, and 2 feet across the bar.

The amount asked for, if appropriated, will be expended in continuing the work under the project.

This work is in the collection district of Delaware. Wilmington is the nearest port of entry, and the amount of revenue collected there during the fiscal year ending June 30, 1900, is $23,031.

Money statement.

July 1, 1899, balance unexpended		$5,004.51
June 30, 1900, amount expended during fiscal year		4,544.51
July 1, 1900, balance unexpended		460.00
Amount (estimated) required for completion of existing project		4,365.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$4,365.00	
For maintenance of improvement	1,000.00	
		5,365.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved—		
June 14, 1880		$5,000
March 3, 1881		3,000
By act passed August 2, 1882		2,000
		10,000
By act of August 11, 1888	$10,000	
By act approved—		
September 19, 1890	5,000	
July 13, 1892	3,000	
By act of August 18, 1894	5,000	
By act of June 3, 1896	5,000	
By act approved March 3, 1899	5,000	
		33,000
Aggregate		43,000

Abstract of proposals received by Gen. William F. Smith, United States agent, for dredging in Murderkill, Smyrna, and Appoquinimink rivers, Delaware, and opened July 10, 1899.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to—	
			Commence.	Complete.
		Cents.		
1	River and Harbor Improvement Co., Camden, N. J.	12	Aug. 15, 1899; capacity, 800 yards daily.	June 30, 1900
2	John L. Mills, Camden, N. J.	12	On approval of contract; capacity, 1,000 yards daily.	Do.
3	James H. Egan, Charleston, S. C	13	Aug. 1, 1899	Do.
4	Delaware Construction Co., Wilmington, Del	13	Aug. 30, 1899; capacity, 500 yards daily.	July 1, 1900
5	American Dredging Co., Philadelphia, Pa	15	July 15, 1899	June 30, 1900

Contract made with the River and Harbor Improvement Company after successfully drawing lots with John L. Mills therefor.

No contracts in force at present.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Bone, iron ore, steel, etc	7,300	$82,000
Canned goods, flour, millwork, etc	10,528	222,800
Cattle, grain, horses, sheep, etc	63,327	387,625
General merchandise	10,000	400,000
Total	91,155	1,092,425
Shipments:		
Railroad ties, ship timber, etc	82,400	209,000
Canned goods, fertilizers, terra cotta, etc	132,115	833,500
Fruit, grain, cattle, poultry, etc	24,121	1,234,350
General merchandise	10,000	400,000
Total	248,636	2,676,850
Total receipts and shipments	339,791	3,769,275

Vessels trading in Smyrna River, Delaware.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamers	3	285	5 to 6	Daily 3 months; then 3 trips weekly.
Steam barge	1	97	6	
Total	4	382	....	

Tugs *Jansen* and *Tedget* and other tugs were employed in shipment of wood, ties, and lime. Also ten or more schooners and sloops carrying wood, ties, poles, and lime.

The above statistics were furnished by the Smyrna Transportation Company, accompanied by the following letter:

SMYRNA, *February 13, 1900.*

DEAR SIR: Please find statements of commerce of Smyrna River inclosed.

With a general increase of volume due to low rates, large crops of fruit (except peaches), and increased output of our factories the statements are in excess of year previous.

We have in view two industries which will probably be located here, mainly on account of facilities offered in transportation.

* * * * * * *

Yours, truly,

A. E. JARDINE, *Secretary.*

Gen. WM. F. SMITH,
Wilmington, Del.

J 4.

IMPROVEMENT OF MURDERKILL RIVER, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 213.

The amount expended on this improvement to June 30, 1899, was $18,495.90.

For the expenditure of the $5,000 provided by the river and harbor act of March 3, 1899, contract was made, after due advertisement, with the River and Harbor Improvement Company, for dredging, at 12 cents per cubic yard, place measurement. Under this contract dredging was begun August 17 and completed December 14, 1899, and during this period shoals at the steamboat wharf at Frederica, and 500 feet below, at Long Reach, Bradleys Canal, Goodwins, and Lower Landing, aggregating about 4,000 feet in length, were dredged to a width of 40 feet and a depth of 6 feet at mean low water, and at the mouth the channel was dredged to a width of 60 feet and a depth of 6 feet at mean low water, to that depth in Delaware Bay, resulting in a channel 6 feet deep at mean low water from the head of navigation at Frederica to Delaware Bay.

The quantity of material removed was 34,367 cubic yards, consisting of mud, sand, and gravel. This was scowed away and deposited in a deep hole 2 miles distant, in the Delaware River, except that which was dredged inside the mouth, where the material was deposited upon the banks above high water.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part of the river is 6 feet to the mouth and 5 feet across the flats at the entrance.

The amount asked for, if appropriated, will be expended in dredging under the project.

The work is in the collection district of Delaware. Wilmington is the nearest port of entry, and the amount of revenue collected there during the fiscal year ending June 30, 1900, is $23,031.

Money statement.

July 1, 1899, balance unexpended		$5,004.10
June 30, 1900, amount expended during fiscal year		4,864.88
July 1, 1900, balance unexpended		139.22
Amount (estimated) required for completion of existing project		27,764.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$7,000.00	
For maintenance of improvement	1,000.00	
		8,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved July 13, 1892	$7,000
By act of August 18, 1894	[1]6,500
By act of June 3, 1896	6,500
By act approved March 3, 1899	5,000
Total	25,000

Abstract of proposals received by Gen. William F. Smith, United States agent, for dredging in Murderkill, Smyrna, and Appoquinimink rivers, Delaware, and opened July 10, 1899.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to—	
			Commence.	Complete.
		Cents.		
1	River and Harbor Improvement Co., Camden, N. J.	12	Aug. 15, 1899; capacity, 800 yards daily.	June 30, 1900
2	John L. Mills, Camden, N. J	12	On approval of contract; capacity, 1,000 yards daily.	Do.
3	James H. Egan, Charleston, S. C	13	Aug. 1, 1899	Do.
4	Delaware Construction Co., Wilmington, Del	12	Aug. 30, 1899; capacity, 500 yards daily.	July 1, 1900
5	American Dredging Co., Philadelphia, Pa	15	July 15, 1899	June 30, 1900

Contract made with the River and Harbor Improvement Company after successfully drawing lots with John L. Mills therefor.

No contracts in force at present.

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[1] Of this amount $1,500 was expended in removing shoal at mouth of St. Jones River.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Bone, rock phosphate, ship timber, etc	5,177	$49,040
Lime, fertilizers, dressed lumber, etc	4,667	134,400
Horses, hay, etc	780	30,000
General merchandise	3,000	450,000
Total	13,624	663,440
Shipments:		
Cord wood and logs	4,200	24,400
Canned goods, barrels, baskets, etc	16,015	628,600
Corn, wheat, fruit, cattle, etc	11,515	349,575
General merchandise	600	90,000
Total	32,330	1,092,575
Total receipts and shipments	45,954	1,756,015

Vessels trading in Murderkill River, Delaware.

Class.	Number.	Aggregate tonnage.	Draft. Feet.	Trips.
Steamer	1	350	6½	Semiweekly; freight and passengers.
Schooners	8	294	3 to 6	Weekly.
Total	9	644	....	

Other sailing vessels whose draft is not known trade in the river.
The above statistics were furnished by Mr. Caleb J. Smithers, Frederica, Del.

J 5.

IMPROVEMENT OF MISPILLION RIVER, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 215.

The amount expended to June 30, 1899, was $38,999.48, of which $21,999.48 is on the present project.

The river and harbor act of March 3, 1899, appropriated $2,500 for the improvement, and for the expenditure of this a contract was made with Benjamin T. Collins, dated July 25, 1899. Under this contract a single-pile jetty was built for a length of 141 feet, extending from the inner end of the old pile and brush jetty northward to the high-water line of the Mispillion River, and a similar jetty from Green Point due east for a length of 206 feet. The latter, which is designed to direct the waters of Cedar Creek into the Mispillion currents, was to extend farther out, but it was found necessary to reduce its proposed length by about one-half, thus permitting the use of the old channel down the bay shore, as a break through a cut made at the mouth by private parties in 1898, under authority of the War Department, had damaged the channel in the route of the original project to deep water in Delaware Bay.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part across the bar at the mouth of the river is 2 feet.

The work is in the collection district of Delaware. Wilmington is the nearest port of entry, and the amount of revenue collected there during the fiscal year ending June 30, 1900, is $23,031.

Money statement.

July 1, 1899, balance unexpended	$2,500.52
June 30, 1900, amount expended during fiscal year	1,537.83
July 1, 1900, balance unexpended	962.69
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement	2,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved—		
March 3, 1879	$3,000	
June 14, 1880	4,000	
March 3, 1881	3,500	
By act passed August 2, 1882	3,000	
By act of August 11, 1888	3,500	
		$17,000
By act approved July 13, 1892	12,000	
By act of August 18, 1894	10,000	
By act approved March 3, 1899	2,500	
		24,500
Aggregate		41,500

Abstract of proposals received by Gen. William F. Smith, United States agent, for construction of jetties at mouth of Mispillion River, Delaware, and opened July 10, 1899.

No.	Name and address of bidder.	Sand Point jetty per linear foot.	Green Point jetty per linear foot.	Time to— Commence.	Time to— Complete.
1	Benjamin T. Collins, Milford, Del.	$3.59	$3.90	30 days after notification.	60 days thereafter.
2	Delaware Construction Co., Wilmington, Del.	7.50	7.50	20 days after notification.	90 days thereafter.
3	B. F. Sweeten & Son, Camden, N. J.	5.00	5.00	.....do	60 days thereafter.

Amount available $2,500, less engineering and contingent expenses.
Contract made with Benjamin T. Collins.
No contracts in force at present.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Raw bone, rock phosphate, etc	36,770	$554,625
Chemicals, fertilizers, lumber, etc	1,257	25,965
Hay, horses, hogs, etc	10,944	222,900
General merchandise	11,355	227,100
Total	60,326	1,030,590
Shipments:		
Railroad ties, timber, logs, etc	14,580	66,160
Canned goods, fertilizers, etc	6,440	392,340
Grain and fruit	14,086	293,750
General merchandise	8,000	120,000
Total	43,106	872,250
Total receipts and shipments	103,482	1,902,840

Vessels trading in Mispillion River, Delaware.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamer	1	125	6	Semiweekly.
Schooners	14	1,450	5 to 7½	Irregularly, carrying coal, wood, oysters, and general merchandise.
Sloop	1	30	4½	

Two steamers and 15 sailing vessels, of an aggregate tonnage of 1,800 tons, repaired during the year. One schooner of 1,200 tons is now on the stocks and will probably be ready to be launched in June or July, 1900.

The above statistics were furnished by Mr. Benjamin T. Collins, of Milford, Del.

J 6.

IMPROVEMENT OF BROADKILL CREEK, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 216.

The amount estimated for the completion of the existing project is for the improvement at the mouth of the creek as designed in 1871 and modified in 1881. No work has been done on it since 1890, and no funds have been available for the purpose. I do not recommend any expenditure at present for an outlet for the Broadkill into Delaware Bay, taking into consideration that success in making it will be most uncertain and the probability that the Broadkill can be connected with the inland waterway from Chincoteague Bay to Delaware Bay at Lewes at much less cost and with greater advantage to both.

This work is in the collection district of Delaware. Wilmington is the nearest port of entry, at which the amount of revenue collected during the fiscal year ending June 30, 1900, is $23,031.

It was not practicable to obtain commercial statistics.

Money statement.

Amount (estimated) required for completion of existing project	$21,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867.	

AMOUNTS APPROPRIATED.

By act approved—	
March 3, 1873	$10,000
June 14, 1880	5,000
March 3, 1881	5,000
By act passed August 2, 1882	$5,000
By act of August 11, 1888	10,000
Total	35,000

J 7.

IMPROVEMENT OF INLAND WATERWAY FROM CHINCOTEAGUE BAY, VIRGINIA, TO DELAWARE BAY, AT OR NEAR LEWES, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 217.

The amount expended on this improvement to June 30, 1899, was $167,255.28.

The amount asked for, if appropriated, will be expended in continuing the improvements between Chincoteague Inlet and Delaware Bay. The most useful work to be done is between Ocean City, Md., and Indian River Bay.

Money statement.

July 1, 1899, balance unexpended	$26,494.72
July 1, 1900, balance unexpended	26,494.72
Amount (estimated) required for completion of existing project	156,250.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	100,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

By act of August 5, 1886	$18,750
By act of August 11, 1888	50,000
By act approved September 19, 1890	50,000
By act approved July 13, 1892	25,000
By act of August 18, 1894	$25,000
By act of June 3, 1896	25,000
Total	193,750

J 8.

IMPROVEMENT OF SUSQUEHANNA RIVER ABOVE AND BELOW HAVRE DE GRACE, MARYLAND.

For full history see Annual Report of the Chief of Engineers for 1900, Part I, page 218.

Up to the close of the fiscal year 1899 $161,155.95 had been expended on this section of the river, including $49,729.15 for dredging the channel to the Fishing Battery Light-House, for breakwaters and piers, and for other work for the Fish Commission.

The funds on hand are of the appropriations of 1890, 1892, and 1894. As the amount is small and is limited to expenditure above the Philadelphia, Wilmington and Baltimore Railroad Bridge, no work has been undertaken on the project during the past fiscal year, but some dredging at Watson Island will probably be necessary soon.

Susquehanna River is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

It was impracticable to obtain complete commercial statistics.

Money statement.

July 1, 1899, balance unexpended	$9,734.05
July 1, 1900, balance unexpended	9,734.05
Amount (estimated) required for annual dredging	20,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867.	

AMOUNTS APPROPRIATED.

By act approved—		
August 30, 1852	$10,000	
June 23, 1866	26,400	
July 25, 1868 (allotment)	5,000	
April 10, 1869 (allotment)	990	
July 11, 1870	12,000	
June 14, 1880	28,000	
March 3, 1881	15,000	
		$97,390
By act passed August 2, 1882	25,000	
By act approved—		
July 5, 1884	20,000	
August 5, 1886	6,000	
By act of August 11, 1888	10,000	
By act approved—		
September 19, 1890	4,000	
July 13, 1892	4,000	
1879, allotment from general appropriation for examinations and surveys	500	
By act of August 18, 1894	4,000	
		73,500
Aggregate		170,890

J 9.

IMPROVEMENT OF ROCKHALL HARBOR AND INNER HARBOR, AT ROCKHALL, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 218.

The amount expended on this improvement to June 30, 1899, was $15,501.38.

No work has been done during the past fiscal year. The expenditure reported was for outstanding liabilities.

It was impracticable to obtain complete commercial statistics.

Rockhall is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

Money statement.

July 1, 1899, balance unexpended		$1,098.62
June 30, 1900, amount expended during fiscal year	$1,095.74	
Returned to Treasury—unexpended balance	2.88	
		1,098.62

AMOUNT APPROPRIATED.

By act of June 3, 1896	$16,600

J 10

IMPROVEMENT OF QUEENSTOWN HARBOR, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 219.

The amount expended on this improvement to June 30, 1899, was $17,288.73, of which $14,000 was on previous projects.

The work done during the past fiscal year was confined to the removal of a shoal which had formed near the outer light. This shoal extended from a point 138 feet above the lower light down for a distance of 950 feet, and had advanced in some places almost across the channel. Two cuts were dredged, 40 feet wide each, one for a length of 800 feet and the other 950 feet. The depth made was 8 feet at mean low water. The quantity of material removed is 4,875 cubic yards, consisting of hard sand, which was scowed away and deposited in the Chester River above Hail Point in 10 fathoms of water.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part of the channel is 8 feet.

No complete commercial statistics have been received. The tonnage reported for 1898 was 25,845.

Queenstown is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

Money statement.

July 1, 1899, balance unexpended	$1,237.52
June 30, 1900, amount expended during fiscal year	848.09
July 1, 1900, balance unexpended	389.43

AMOUNTS APPROPRIATED.

By act approved—	
March 3, 1871	$5,000
June 10, 1872	6,000
March 3, 1879	3,000
Total	14,000
By act of June 3, 1896	5,000
Aggregate	19,000

J II.

IMPROVEMENT OF CHESTER RIVER, MARYLAND, FROM CRUMPTON TO JONES LANDING.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 219.

Up to the close of the fiscal year ending June 30, 1899, $10,879.74 had been expended on the improvement.

Under contract made with the Baltimore Dredging Company, dated September 25 and approved October 18, 1899, the channel was dredged during the months of October and November, 1899, to the project width and depth from the point where operations were suspended in 1898 for a distance of 2,925 feet, or to about 2,900 feet below Jones Landing, the upper terminus under the project. The quantity of material removed was 20,090 cubic yards, consisting of sand and mud, which was deposited upon the banks about 45 feet distant from the channel.

To dredge the remaining distance to Jones Landing and to redredge the channel where it has shoaled will, it is estimated, require the removal of 32,500 cubic yards of material, at a cost of $5,350. This amount is included in the estimate given below. No provision was made for maintenance in the original estimate, and the work has extended over a period of nine years, during which time the channel has been redredged from time to time where needed, as far as the money appropriated would permit.

The object of the improvement is to extend navigation farther up the river, and the nearest point above for a landing is at Jones Landing, which is near the county road. The maximum draft that can be carried June 30, 1900, over the shoalest part of the improved portion of the river, or to within 2,900 feet of Jones Landing, is 4 feet, and above it is 2 feet, at mean low water.

It was impracticable to obtain complete commercial statistics.

This work is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

Money statement.

July 1, 1899, balance unexpended	$3,320.26
June 30, 1900, amount expended during fiscal year	2,804.35
July 1, 1900, balance unexpended	515.91
July 1, 1900, outstanding liabilities	249.12
July 1, 1900, balance available	266.79
Amount (estimated) required for completion of existing project	5,350.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	5,350.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

By act approved—	
September 19, 1890	$5,000
July 13, 1892	3,000
By act of August 18, 1894	1,500
By act of June 3, 1896	1,500
By act of March 3, 1899	3,200
Total	14,200

Abstract of proposals received by Gen. Wm. F. Smith, United States Agent, and opened September 18, 1899, for dredging certain rivers along Eastern Shore of Chesapeake Bay, including Chester River, Maryland.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	1899.	1900.
1	Baltimore Dredging Company, Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Company, Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Company, Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract made with the Baltimore Dredging Company.
No contracts in force at present.

J 12.

IMPROVEMENT OF CHOPTANK RIVER, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 220.

The amount expended on this improvement to the close of the fiscal year ending June 30, 1899, was $51,847.83.

For the expenditure of the $8,000 appropriated by the river and harbor act of March 3, 1899, contract was made, after due advertisement, with the Baltimore Dredging Company for dredging at 12.4 cents per cubic yard, place measurement; and under this contract the channel was dredged between November, 1899, and April, 1900, to the approved dimensions, 75 feet wide and 8 feet deep at mean low water, from the railroad bridge above Denton to the brick mills, and from Greensboro in a down-river direction a distance of 4,760 feet, and a turning basin was dredged at Greensboro. The quantity of material removed is 55,003 cubic yards, and consisted of sand and gravel, with some clay. This was deposited upon and back of old dredged banks adjacent.

This leaves a stretch of about 1,600 feet previously dredged to 7 feet to be dredged to an 8-foot depth, and for restoration of the channel where it has shoaled, to complete the project.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part of the river under improvement is 6.5 feet.

It is proposed to expend the amount asked for, if appropriated, in continuing dredging under the contract.

Choptank River is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

Money statement.

July 1, 1899, balance unexpended		$8,152.17
June 30, 1900, amount expended during fiscal year		7,357.45
July 1, 1900, balance unexpended		794.72
July 1, 1900, outstanding liabilities		682.04
July 1, 1900, balance available		112.68
Amount (estimated) required for completion of existing project		8,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$4,000.00	
For maintenance of improvement	2,000.00	
		6,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved—	
June 14, 1880	$5,000
March 3, 1881	5,000
By act passed August 2, 1882	5,000
By act approved—	
July 5, 1884	5,000
August 5, 1886	10,000
By act of August 11, 1888	7,500
By act of approved—	
September 19, 1890	$7,500
July 13, 1892	3,000
By act of August 18, 1894	2,000
By act of June 3, 1896	2,000
By act approved March 3, 1899	8,000
Total	60,000

Abstract of proposals received by Gen. William F. Smith, United States Agent, and opened September 18, 1899, for dredging certain rivers along eastern shore of Chesapeake Bay, including Choptank River, Maryland.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	1899.	1900.
1	Baltimore Dredging Co., Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Co., Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Co., Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract made with Baltimore Dredging Company.
No contracts in force at present.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Ice, oysters, fish	131	$1,912.00
Canned goods, fertilizers, lumber, etc	3,894	208,598.70
Horses, sheep, etc	456	92,397.80
General merchandise	8,054	403,240.00
Total	12,535	706,148.50
Shipments:		
Canned goods, lumber, flour, etc	1,582	88,105.00
Fruit, grain, cattle, etc	5,196	121,543.50
General merchandise	2,086	125,160.00
Total	8,864	334,808.50
Total receipts and shipments	21,399	1,040,957.00

Vessels trading in Choptank River, Maryland.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamers	2	1,208	5½	Daily service alternately.

The above statistics were furnished by the Baltimore, Chesapeake and Atlantic Railway Company and represent the business of that line only.

J 13.

IMPROVEMENT OF LA TRAPPE RIVER, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 222.

The amount expended to the close of the fiscal year 1899 was $7,213.87, and the channel within the river had been completed. The proposed channel at the mouth, about 1,600 feet long, had been dredged to the approved width of 150 feet for a distance of 400 feet and to a width of 100 feet only for the remaining 1,200 feet. No work has been done during the past fiscal year. The latter portion therefore remains to be widened 50 feet in order to conform to the approved project, and it is estimated that to complete it $2,500 will be required in addition to the amount already expended and originally estimated as the cost of the whole improvement. This increase in the estimate is solely due to shoaling in the upper river since the survey was made and to the treacherous character of the material at the bar. The latter consists principally of live pure sand, and already, during the progress of the first contract, at that point it became necessary to remove and pay for a much larger quantity of material on that account than was estimated for, and the depth of cutting had to be increased to maintain the dredged depth, the contract being for scow measurement. It is expected, however, that the additional amount asked for will complete the channel if no unforeseen shoaling has taken place since operations were suspended. There are no contracts in force.

La Trappe River is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

Money statement.

July 1, 1899, balance unexpended	$36.13
July 1, 1900, balance unexpended	36.13
Amount (estimated) required for completion of existing project	2,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902.	2,500.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

By act approved July 13, 1892	$2,500
By act of August 18, 1894	4,750
Total	7,250

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Coal, ice, bricks, etc	5,206	$46,300
Grain, horses, sheep, etc	754	17,100
General merchandise	500	25,000
Total	6,460	88,400
Shipments:		
Cord wood, logs, and railroad ties	1,124	3,600
Canned goods, sawed lumber, etc	675	22,500
Berries, fruit, poultry, etc	3,974	103,800
General merchandise	360	8,650
Total	6,133	138,550
Total receipts and shipments	12,593	226,950

Vessels trading in La Trappe River, Maryland.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamers	3	1,177	9	6 times a week.
Schooners	10	462	6 to 8	3 trips per month.
Total	13	1,639		

There are many other boats in grain season making about two trips in the year. The above statistics are furnished by C. C. Wheeler & Co., of Hillsboro, Md.

J 14.

IMPROVEMENT OF WARWICK RIVER, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 222.

The amount expended to June 30, 1899, on the improvement of this river was $12,853.77, of which $9,853.77 is on the present project.

For the expenditure of the $2,000 appropriated by the river and harbor act of March 3, 1899, contract was made, after due advertisement, with the Baltimore Dredging Company for dredging at 12.4 cents per cubic yard, place measurement, and under this contract the channel was dredged in April last to a depth of 10 feet at mean low water and 100 feet wide a distance of 1,360 feet from opposite the upper side of Devils Wind Gap upstream, and the turning basin was redredged by making a cut 600 feet long on the north side and one 540 feet long on the south side, the width of cutting ranging between 35 and 50 feet and the depth made being 10 feet at mean low water. The quantity of material removed is 13,797 cubic yards, consisting of soft mud, which was scowed away and deposited in a deep pocket in the Choptank River above Jamaica Point.

This leaves about 450 feet of the channel at Devils Wind Gap to be dredged to the project dimensions and the restoration of the channel at other points where it has shoaled to complete the project.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part of the river is 9 feet.

It is proposed to expend the amount asked for, if appropriated, in continuing dredging under the contract.

Warwick River is in the collection district of Baltimore, which is the nearest port of entry. The amount of revenue collected there during the fiscal year ending June 30, 1900, is $2,849,565.53.

Money statement.

July 1, 1899, balance unexpended		$2,146.23
June 30, 1900, amount expended during fiscal year		1,962.79
July 1, 1900, balance unexpended		183.44
July 1, 1900, outstanding liabilities		171.05
July 1, 1900, balance available		12.39
Amount (estimated) required for completion of existing project		6,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$3,600.00	
For maintenance of improvement	400.00	
		4,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved June 14, 1880	$3,000
By act approved March 3, 1881	3,000
Total	6,000
By act approved July 13, 1892	6,000
By act of August 18, 1894	2,000
By act of June 3, 1896	2,000
By act of March 3, 1899	2,000
Total on present project	12,000
Aggregate	18,000

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened September 18, 1899, for dredging certain rivers along eastern shore of Chesapeake Bay, including Warwick River, Maryland.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	1899.	1900.
1	Baltimore Dredging Co., Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Co., Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Co., Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract made with Baltimore Dredging Company.
No contract in force at present.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Fish, flour, lumber, etc	982	$61,244
Cattle, horses, etc	201	4,912
General merchandise	747	44,820
Total	1,930	110,976
Shipments:		
Canned goods, fertilizers, etc	404	23,124
Fruit, wheat, farm products, etc	1,077	30,167
General merchandise	722	37,820
Total	2,203	100,611
Total receipts and shipments	4,133	211,587

Vessels trading in Warwick River, Maryland.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamers	2	1,208	5¼	Daily service, alternately.

The above statistics were furnished by the Baltimore, Chesapeake and Atlantic Railway Company and represent the business of that line only.

J 15.

IMPROVEMENT OF NANTICOKE RIVER, DELAWARE AND MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 224.

The amount expended on this improvement to June 30, 1899, was $7,989.15, of which $2,989.15 is on the present project.

For the expenditure of the $3,000 provided by the river and harbor act of March 3, 1899, a contract was made with the Baltimore Dredging Company, for dredging at 12.4 cents per cubic yard, place measurement; and under this a cut ranging in width from 0 to 60 feet was made on June 29 and 30, 1900, at the bend in the river 2,900 feet below the railroad bridge for a distance of 200 feet, the depth made being 9 feet at mean low water. The quantity of material removed was 1,669 cubic yards, consisting of sand and mud, which was deposited upon the flats on the north side of the channel. It is intended to continue work under this contract in widening the channel at this bend to 150 feet, and to redredge where found necessary in other parts of the river.

The maximum draft that can be carried, June 30, 1900, over the shoalest part of the river under improvement is 9 feet.

Nanticoke River is in the collection district of the eastern district of Maryland. Crisfield is the nearest port of entry. As no dutiable articles are discharged there no revenue was collected during the fiscal year.

Money statement.

July 1, 1899, balance unexpended		$3,010.85
June 30, 1900, amount expended during fiscal year		204.82
July 1, 1900, balance unexpended		2,806.03
July 1, 1900, outstanding liabilities	$190.00	
July 1, 1900, amount covered by uncompleted contracts	2,616.03	
		2,806.03

AMOUNTS APPROPRIATED.

By act of June 3, 1896	$3,000
By act approved March 3, 1899	3,000
Total	6,000

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened September 18, 1899, for dredging certain rivers along eastern shore of Chesapeake Bay, including Nanticoke River, Delaware and Maryland.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	1899.	1900.
1	Baltimore Dredging Co., Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Co., Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Co., Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract made with Baltimore Dredging Company.

The only contract in force is that above referred to, with the Baltimore Dredging Company.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Raw bone, phosphates, ship timber, etc	231	$6,468
Fertilizers, flour, lumber, etc	3,959	91,772
Cattle, horses, hay, etc	631	28,315
General merchandise	1,125	67,500
Total	5,946	194,055
Shipments:		
Canned goods, basket and barrel material, etc	4,416	145,012
Berries, peaches, grain, poultry, etc	5,765	328,255
General merchandise	1,094	65,640
Total	11,275	538,907
Total receipts and shipments	17,221	732,962

Vessels trading in Nanticoke River, Delaware and Maryland.

Class.	Number.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamer	1	459	6	Triweekly.
Schooners and sloops	Unknown	1,200	5 to 7	Grain, lumber, and fertilizers.

The above statistics were furnished by the Baltimore, Chesapeake and Atlantic Railway Company.

J 16.

IMPROVEMENT OF BROAD CREEK RIVER, DELAWARE.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 225.

Under contract made with the Baltimore Dredging Company, dated September 25, 1899, for the expenditure of the $5,000 appropriated March 3, 1899, dredging was begun on May 23, 1900, at a point about 300 feet below the point where operations were suspended under the preceding contract, owing to filling in from the channel above, and the channel was dredged to a width of 70 feet to a point 600 feet above the Delaware Railroad bridge, a distance of 3,000 feet, and thence for a distance of 500 feet to a width of but 60 feet, the depth made being 8 feet at mean low water throughout. The quantity of material removed was 30,307 cubic yards, consisting of clay and sand, which was deposited upon and back of an old dredged bank on the south side of the river. This brings the 8-foot channel to within 500 feet of the county bridge at the upper end of the town of Laurel. It was necessary to reduce the width at the upper end to 60 feet as the channel there is narrow and would not bear a greater width of dredging without endangering the wharves on both sides of the river, and the width through the Delaware Railroad bridge was made 55 feet. During the progress of this dredging an examination was made of the work done last year and this shows that the channel has well maintained itself.

The result of these operations is a good channel not less than 8 feet deep at mean low water between the towns of Bethel and Laurel.

Further operations were suspended on June 27 with the understanding that the contractors are to widen the channel to enable vessels to turn around at a point about 500 feet above the Delaware Railroad bridge upon the completion of the dredging to be done by them on the Nanticoke River, provided the Department can in the meantime obtain the consent of the riparian owners concerned.

The maximum draft that can be carried June 30, 1900, at mean low water, over the shoalest part of the river is 8 feet.

Broad Creek River is in the collection district of Delaware. Wilmington is the nearest port of entry and the amount of revenue collected there during the fiscal year ending June 30, 1900, is $23,031.

Money statement.

July 1, 1899, balance unexpended		$7,536.47
June 30, 1900, amount expended during fiscal year		3,975.60
July 1, 1900, balance unexpended		3,560.87
July 1, 1900, outstanding liabilities	$2,600.00	
July 1, 1900, amount covered by uncompleted contracts	960.87	
		3,560.87
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900, for maintenance of improvement		1,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

AMOUNTS APPROPRIATED.

By act approved—	
June 14, 1880	$5,000
March 3, 1881	10,000
By act passed August 2, 1882	5,000
By act approved August 5, 1886	10,000
By act of August 11, 1888	5,000
Total	35,000
By act approved July 13, 1892	$5,000
By act of August 18, 1894	[1]5,000
By act of June 3, 1896	5,000
By act approved March 3, 1899	5,000
Total, present project	20,000
Aggregate	55,000

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened September 18, 1899, for dredging certain rivers along eastern shore of Chesapeake Bay, including Broad Creek River, Delaware.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	1899.	1900.
1	Baltimore Dredging Co., Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Co., Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Co., Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract made with Baltimore Dredging Company.

The only contract in force is that above referred to, with the Baltimore Dredging Company.

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[1] This appropriation was applied to removing bar on Nanticoke River, under the terms of the appropriation.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Coal, iron ore, etc	592	$9,381
Fertilizers, sawed lumber, etc	6,725	53,875
General merchandise	780	39,000
Total	8,097	102,256
Shipments:		
Canned goods, fruits, lumber, etc	9,567	53,000
General merchandise	312	15,600
Total	9,879	68,600
Total receipts and shipments	17,976	170,856

Vessels trading in Broad Creek River, Delaware.

Class.	Number.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Sailing vessels	16	1,110	4 to 8	Monthly.
Do	16	1,152		From time to time, irregularly.

Two wooden vessels, aggregate tonnage 350, built and ten vessels of an aggregate tonnage of 1,600 repaired during the year.

The above statistics were procured by Mr. John R. Beckett, inspector, United States Engineer Department.

J 17.

IMPROVEMENT OF WICOMICO RIVER, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 226.

The amount expended by the General Government to June 30, 1899, in the improvement of this river is $72,930.02, of which $22,930.02 is on the present project.

Nothing was done on the work during the past fiscal year, as there were no funds available. The expenditures were for outstanding liabilities.

Wicomico River is in the eastern collection district of Maryland. Crisfield is the nearest port of entry. As no dutiable articles are discharged there no revenue was collected during the fiscal year.

Money statement.

July 1, 1899, balance unexpended	$269.98
June 30, 1900, amount expended during fiscal year	267.98
July 1, 1900, balance unexpended	2.00
Amount (estimated) required for completion of existing project	6,798.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	6,798.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

AMOUNTS APPROPRIATED.

By act of—	
June 10, 1872	$5,000
March 3, 1873	5,000
June 28, 1874	5,000
March 3, 1875	5,000
August 14, 1876	5,000
June 18, 1878	5,000
March 3, 1879	3,000
June 14, 1880	5,000
March 3, 1881	2,000
July 5, 1884	10,000
Total	50,000
September 19, 1890	10,000
July 13, 1892	6,500
August 18, 1894	3,000
June 3, 1896	3,700
Total on present project	23,200
Aggregate	73,200

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Bone, phosphate rock, oysters, etc	5,654	$193,272
Flour, furniture, mill work, etc	84,997	725,525
Horses, hay, oats, etc	1,225	40,081
General merchandise	96,050	1,178,000
Total	187,926	2,136,878
Shipments:		
Coal and cordwood	10,000	30,250
Canned goods, fertilizers, lumber, etc	18,560	369,665
Corn, wheat, fruit, etc	4,367	204,885
General merchandise	31,439	1,286,340
Total	64,366	1,891,140
Total receipts and shipments	252,292	4,028,018

Vessels trading in Wicomico River, Maryland.

Class.	No.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamer	1	704	5½	Triweekly.
Schooners	11	784	5 to 8½	Weekly.
Do	2	1,000	....	Bimonthly.
Do	3	545	7½ to 9	Occasionally.

Various other small sloops, bugeyes, pungies, and other sailing craft come here irregularly, bringing oysters, wheat, and corn, and carrying back lumber, building materials, flour, meal, and merchandise of all kinds.

One steamer and 50 sailing vessels, 1,904 tons in the aggregate, repaired during the year.

The above statistics were furnished by the Baltimore, Chesapeake and Atlantic Railway Company and the Hon. E. Stanley Toadvin, of Salisbury, Md.

J 18.

IMPROVEMENT OF MANOKIN RIVER, MARYLAND.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 227.

The amount expended on the improvement to June 30, 1899, is $18,975. Under contract made with Chester T. Caler, December 24, 1896, the widening of the 60-foot cut at the mouth was continued in July of the past year for a length of 700 feet, and the channel previously made was redredged for a distance of 2,175 feet, and in the upper river the channel was dredged to a depth of 6 feet at mean low water from that depth opposite Dashiells Creek upstream toward the county wharf for a distance of 4,940 feet, the width made being 50 feet. This latter work was done under the terms of the act making the appropriation. The quantity of material removed was 34,033 cubic yards. Of this, 15,023 cubic yards of mud was dredged at the bar and was deposited upon the flats on the south side of the channel, about 50 feet distant, and the remainder, consisting of clay, sand, and mud, was dredged in the upper river and deposited upon the adjacent marshes. At the close of these operations there was a channel 6 feet deep from Sharps Point to about a mile above Dashiells Creek, and a slightly less depth to the steamboat wharf above. At the mouth a cut 6 feet deep had been dredged for a length of 13,515 feet, of which 4,220 feet were 80 feet wide and the remainder 60 feet wide. Between Cockerill Point and Locust Point, where the work on the project originally began, the channel had shoaled to 4 feet, and above that year's limit of dredging operations the channel for a distance of 1,600 feet had a depth at its shoalest point of about 3 feet.

The river and harbor act of March 3, 1899, appropriated $1,500 for continuing this improvement, and for the expenditure of this a contract has been made with the Baltimore Dredging Company for dredging at 12.4 cents per cubic yard, place measurement. This contract includes other points along the Eastern Shore of Chesapeake Bay, the entire work to be completed by December 1, 1900.

The maximum draft that can be carried June 30, 1900, at mean low water over the shoalest part of the channel between Locust Point and Sharps Point is 3 feet, and in the river to the steamboat wharf it is about 6 feet.

It was impracticable to obtain commercial statistics.

Manokin River is in the collection district of the eastern district of Maryland. Crisfield is the nearest port of entry. As no dutiable articles are discharged there no revenue was collected during the fiscal year.

Money statement.

July 1, 1899, balance unexpended	$5,525.00
June 30, 1900, amount expended during fiscal year	3,848.28
July 1, 1900, balance unexpended	1,676.00
July 1, 1900, amount covered by uncompleted contracts	1,500.00
July 1, 1900, balance available	176.00

AMOUNTS APPROPRIATED.

By act approved—	
September 19, 1890	$7,500
July 13, 1892	7,500
Act of August 18, 1894	4,000
Act of June 3, 1896	[1]4,000
Act of March 3, 1899	1,500
Total	24,500

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened September 18, 1899, for dredging certain rivers along eastern shore of Chesapeake Bay, including Manokin River, Maryland.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	1899.	1900.
1	Baltimore Dredging Co., Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Co., Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Co., Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract made with Baltimore Dredging Company.

The only contract in force is that above referred to, with the Baltimore Dredging Company.

J 19.

IMPROVEMENT OF POCOMOKE RIVER, MARYLAND, BELOW SNOW HILL.

For previous history see Annual Report of the Chief of Engineers for 1900, Part I, page 228.

The amount expended on this improvement to June 30, 1899, was $24,987.26, of which $4,487.26 is on the present project.

No work has been done on the improvement during the past fiscal year.

For the expenditure of the $3,000 appropriated by the river and harbor act of March 3, 1899, a contract for dredging has been made with the Baltimore Dredging Company at 12.4 cents per cubic yard, place measurement. The contract includes other places along the eastern shore of Chesapeake Bay, and the entire work is to be completed by December 1, 1900.

Pocomoke River is in the collection district of the eastern district of Maryland. Crisfield is the nearest port of entry. As no dutiable articles are discharged there no revenue was collected during the fiscal year.

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[1] Of this amount $2,000 is for work in the upper river, not covered by the project.

Money statement.

July 1, 1899, balance unexpended		$3,512.74
June 30, 1900, amount expended during fiscal year		378.43
July 1, 1900, balance unexpended		3,134.31
July 1, 1900, amount covered by uncompleted contracts		3,134.31
Amount (estimated) required for completion of existing project		6,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$4,000	
For maintenance of improvement	500	
		4,500.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

AMOUNTS APPROPRIATED.

By act approved—		
June 18, 1878		$10,000.00
March 3, 1879		2,500.00
August 5, 1886		8,000.00
Total		20,500.00
By act of June 3, 1896	$5,000.00	
By act approved March 3, 1899	3,000.00	
Total on present project		8,000.00
Aggregate		28,500.00

Abstract of proposals received by Gen. W. F. Smith, United States agent, and opened September 18, 1899, for dredging certain rivers along eastern shore of Chesapeake Bay, including Pocomoke River, Maryland, below Snow Hill.

No.	Name and address of bidder.	Price per cubic yard, place measurement.	Time to— Commence.	Time to— Complete.
		Cents.	*1899.*	*1900.*
1	Baltimore Dredging Co., Baltimore, Md	12.4	Oct. 15	Dec. 1
2	River and Harbor Improvement Co., Camden, N. J	14.5	Dec. 1	Jan. 1
3	American Dredging Co., Philadelphia, Pa	15.5	Oct. 15	Nov. 30

Contract with Baltimore Dredging Company.

The only contract in force is that above referred to, with the Baltimore Dredging Company.

COMMERCIAL STATISTICS FOR CALENDAR YEAR 1899.

Receipts and shipments.

Class.	Tons.	Value.
Receipts:		
Coal, dimension stone, ice, etc	1,398	$7,888.00
Fertilizers, flour, millwork, etc	3,310	87,689.00
Cattle, hogs, horses, etc	684	21,784.00
General merchandise	16,759	1,005,540.00
Total	22,146	1,122,901.00
Shipments:		
Cord wood, logs, ship timber, etc	1,851	32,962.60
Canned goods, crates, lumber, etc	20,847	844,054.00
Fruit, grain, eggs, poultry, etc	6,022	144,103.70
Total	28,720	521,120.30
Total receipts and shipments	50,866	1,644,021.30

Vessels trading in Pocomoke River, Maryland.

Class.	Number.	Aggregate tonnage.	Draft.	Trips.
			Feet.	
Steamer	1	654	6½	Semiweekly.
Schooners and sloops	Unknown.	6,610	5 to 7	For grain, lumber, fertilizers, etc.

One steamer was repaired during the year. The number of sailing vessels built and repaired is not known.

The above statistics were furnished by the Baltimore, Chesapeake and Atlantic Railway Company.

J 20.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Wreck of schooner Mary L. Bird.—It was reported in November, 1899, by Joseph T. Potter, of Little Creek, Del., and others, that a vessel was lying sunk in Little Creek, obstructing navigation. Upon examination the report was found to be correct. The wreck was the schooner *Mary L. Bird*, built in 1850, 52 feet long and 18 feet beam, with a tonnage of 22 tons. It was full of mud and had about 10 tons of broken stone as ballast. The vessel was sunk in July, 1899, at a point about 1 mile below Little Creek Landing, in Little Creek, and as the creek is not over 60 feet wide at the point where the wreck lay it formed a serious obstruction to navigation. Under authority of the Chief of Enginneers for the removal of the wreck, and an allotment for the purpose, proposals were invited by due advertisement, and award made and contract dated March 16, 1900, entered into with the lowest bidder, Charles W. Johnston, of Lewes, Del., at $283. Under this contract operations were begun March 28, and completed April 2, 1900. The wreck was broken up by means of dynamite, and the débris was placed ashore above high water. Upon completion of this work the bottom of the river on the late site of the wreck was found to be in its normal condition. The total cost of the work, including inspection and all other expenses, was $325.71.

Wreck in Cambridge Harbor, Maryland.—On March 20, 1900, wreck was reported as lying sunk in front of the wharf of S. L. Webster & Son, at Cambridge, Md., obstructing navigation. Upon examination it was found that the wreck referred to was the bottom frame and some side planking of an old flat-bottom boat, 30 feet long and about 7 feet beam, lying lengthwise 10 feet from Webster wharf in about 5½ feet of water at low tide. It there formed an obstruction to navigation. Under authority of the Chief of Engineers, and an allotment of $75 therefor, the wreck was removed on April 19 and 20, 1900, by breaking it up and placing the broken parts above the high-water line ashore, at a total cost of $44.31. The unexpended balance was returned to the Treasury.

Wreck of schooner Wm. H. Roach.—In the early part of April, 1900, the postmaster at Inverness, Somerset County, Md., reported a wreck between Fishing Island and Maddox Island, in the Manokin River, Maryland, as in a position extremely dangerous to navigation. Upon an examination by this department the wreck was found to be the schooner *Wm. H. Roach*, built in 1860, 53½ feet long, 18 feet beam, and 5½ feet draft, with a gross tonnage of 28 tons. In the summer of 1899, when the oyster season was over, this boat was stripped and beached at the head of the cove near by, but during the following winter the ice carried her out and dropped her where she now lies. The wreck is entirely submerged at half tide, in the track of vessels beating in and out of the river, and thus is a very dangerous obstruction. Under authority of the Chief of Engineers for the removal of the wreck, and an allotment of $400 for the purpose, proposals were invited and opened June 25, 1900, Charles W. Johnston, of Lewes, Del., who offered to remove the wreck for $360, being the lowest bidder. At the close of the fiscal year the matter of award was under consideration.

Wreck of bugeye Columbia.—Under date of April 19, 1900, the collector of the port of Baltimore reported as a dangerous obstruction the schooner *Columbia*, lying 100 yards northwest of Deals Island wharf, Maryland. Upon an examination the vessel was found to be the schooner-rigged bugeye *Columbia*, built in 1892, and 63 feet long, 22 feet beam, and 5 feet draft. She was wrecked in February, 1900, and was lying sunk in 8 feet of water at low tide to the north of the steamboat wharf, about 300 feet distant therefrom and about one-fourth mile from the shore. The wreck being considered an obstruction to navigation, authority was granted by the Chief of Engineers and an allotment of $400 made for its removal. Proposals were invited and opened June 25, 1900, Charles W. Johnston, of Lewes, Del., being the lowest bidder, at $375. At the close of the fiscal year the matter of award of contract was under consideration.

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened March 8, 1900, for removal of wreck of schooner Mary L. Bird, in Little Creek, Delaware.

No.	Name and address of bidder.	Amount of proposal.	Time to— Commence (days after notification).	Time to— Complete (days).
1	Cornelius J. Kelly, Atlantic City, N. J	$345	10	10
2	Joseph T. Potter, Little Creek, Del	500	30	30
3	John J. Fitzpatrick, Plattsburg, N. Y	325	10	5
4	Creamer Wrecking Co., Philadelphia, Pa	295	5	15
5	Charles Booye, Atlantic City, N. J	550	10	30
6	Charles W. Johnston, Lewes, Del	283	10	30

Contract made with Charles W. Johnston.

Abstract of proposals received by Gen. William F. Smith, United States agent, and opened June 25, 1900, for removal of wrecks Columbia and Wm. H. Roach.

No.	Name and address of bidder.	Time to—		For removal of—	
		Commence (days after award).	Complete (days after acceptance of bid).	Wreck Wm. H. Roach.	Wreck Columbia.
1	Louis E. Broom, Baltimore, Md	10	15	....	$475.00
2	Do	10	15	$475.00	....
3	Wm. H. French, Norfolk, Va	30	60	[a] 446.00	....
4	Do	30	60	....	[a] 446.00
5	Charles W. Johnston, Lewes, Del	5	10	....	375.00
6	Do	5	10	360.00	....

[a] These offers are conditional upon acceptance of both.

Contract made with Charles W. Johnston for the removal of both wrecks.

J 21.

EXAMINATION AND SURVEY OF ST. JONES RIVER, DELAWARE.

[Printed in House Doc. No. 166, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 7, 1899.

SIR: I have the honor to submit the accompanying copies of reports by Gen. W. F. Smith, United States agent, dated May 8, 1899, and November 29, 1899, of the results of preliminary examination and survey, respectively, of St. Jones River, Delaware, from its mouth to the highest point of feasible navigation, made in pursuance of the requirements of the river and harbor act of March 3, 1899.

General Smith states that the channel at the mouth can not be maintained without expensive protective works, which the commerce, though growing, does not seem to warrant, but that the removal of about 10,000 cubic yards of material will, except in unusual cases of violent storms, maintain a 7-foot channel across the flats to the 7-foot curve in Delaware Bay, and he presents a project for such a channel extending up to Lebanon, the width at the mouth to be 100 feet and inside the river to be 60 feet, widening somewhat at bends and existing cut-offs, at an estimated cost, including contingencies, of $47,074.50.

In the opinion of General Smith, such improvement is warranted by the commerce of the river, and Col. Peter C. Hains, Corps of Engineers, Division Engineer, concurs in the recommendations of the local officer.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF ST. JONES RIVER, DELAWARE, FROM ITS MOUTH TO THE HIGHEST POINT OF FEASIBLE NAVIGATION.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., May 8, 1899.

GENERAL: Referring to Department letter of March 20, I have the honor to state that the data in this office enable me to report upon St. Jones River, Delaware, a preliminary examination of which is provided for in the river and harbor act of March 3, 1899, and I therefore report upon it as follows:

A project—the original project—for the improvement of this river was made in 1880. It provided for a 3-foot low-water channel 100 feet wide across the bar at the mouth, protected by a jetty, at an estimated cost of $35,000. The project was enlarged in 1884 to include the removal of the shoals in the river to Dover to a depth of 6 feet at mean low water, and it was further modified in 1889 by dispensing with the jetty and substituting banks thrown up along the sides of the cut.

The improvements were begun in 1885 and were completed in 1890, and the result was a 6-foot low-water channel inside the river, nowhere less than 40 feet wide, and a channel of the same depth and 100 feet wide across the flats at the mouth, the total amount expended being $40,000.

In 1892 the channel at the mouth had shoaled again at the outer end to 4 feet, and an examination of it having been ordered by the river and harbor act of July 13, 1892, it was recommended that it be redredged where necessary to its original depth, 6 feet.

The river and harbor act of August 18, 1894, appropriated $6,500 for the Murderkill River, Delaware, and authorized the expenditure of $1,500 thereof in removing the bar and obstructions at the mouth of the St. Jones River. With this appropriation a cut 60 feet wide and 6 feet deep was made during the summer of 1895 through the shoal portion of the channel at the mouth of the river.

In 1880 it was reported that the business of the river was carried on by 3 vessels of 125 to 150 tons of 6 feet draft; 5 vessels of 30 to 125 tons, 5 feet draft, and a steam tug of 20 tons of 4 feet draft. The value of the commerce was not given. In 1898 the commerce of the river was carried on by a steamer, 22 schooners, and 12 sloops, of an aggregate of 1,669 tonnage, besides several tugs with barges. The receipts and shipments of freight amounted to 65,486 tons, valued at $3,195,489, and 2,652 passengers were carried between the St. Jones River and Philadelphia.

I am of the opinion that the present and prospective demands of the commerce of this river warrant its improvement.

No reliable instrumental survey of the river has ever been made except at the mouth, the original estimate and project having been based upon a rough reconnaissance made with the aid of the county map. The length of the river to Lebanon, the head of navigation, and which is probably the highest point of feasible navigation, is about 12 miles. A complete survey of this distance is estimated to cost $750.

Very respectfully, your obedient servant,

WM. F. SMITH,
United States Agent.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., May 11, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

Based upon the facts and reasons given by the district engineer in this report, and taking into consideration the present and prospective demands of commerce, I am of opinion that this river is worthy of improvement by the General Government.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of St. Jones River, Delaware, "from its mouth to the highest point of feasible navigation."

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

SURVEY OF ST. JONES RIVER, DELAWARE, FROM ITS MOUTH TO THE HIGHEST POINT OF FEASIBLE NAVIGATION.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., November 29, 1899.

GENERAL: In compliance with Department instructions of August 25, 1899, I have the honor to submit the following report on a survey of St. Jones River, Delaware, made under the provisions of the river and harbor act of March 3, 1899:

This river has heretofore been improved by the Government. A statement of the work done and the commerce on the river in 1898, which is substantially the same at this date, will be found in my preliminary report, dated May 8, 1899.

The survey was made in September last by two field parties under Mr. Chas. M. Bird, civil engineer, and Mr. Oscar D. Ridings, civil engineer, respectively, under the supervision of Mr. George W. T. Miller, assistant engineer, and extended from Lebanon to the 9-foot curve in Delaware Bay, a distance of 12.9 miles. The results are indicated in the eight tracings[1] which I inclose herewith. These show that the

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[1] Not printed.

6-foot depth made inside the river in 1890 has been well maintained, but that the width has contracted to about 35 feet and that the 6-foot depth made at the mouth in 1895 has shoaled to about 3 feet.

Experience shows that without expensive protective works the channel at the mouth can not be maintained, which the commerce, though growing, does not seem to warrant. A removal yearly of about 10,000 cubic yards of material will, except in unusual cases of violent storms, maintain a 7-foot channel across the flats to the 7-foot curve in Delaware Bay. In the river proper there are some "cut-offs" which those interested in the improvement desire to have made. These would be of great benefit to the navigation of the river, but in my judgment the expense seems greater than the commerce will warrant, they requiring the additional dredging of about 120,000 yards of material. I recommend a 7-foot channel from the 7-foot depth in Delaware Bay to Lebanon, the width at the mouth to be 100 feet and inside the river 60 feet, widening somewhat at the bends and in existing cut-offs, that improvement being, in my opinion, warranted by the commerce of the river. The estimated cost of this is:

Dredging across the flats at the mouth, 62,000 cubic yards, at 15 cents per yard	$9,300.00
For dredging inside the river, 223,300 cubic yards, at 15 cents per yard	33,495.00
	42,795.00
Add 10 per cent for engineering and contingent expenses	4,279.50
Total	47,074.50

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., December 2, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I concur in the recommendations of the district engineer.

Peter C. Hains,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

J 22.

EXAMINATION AND SURVEY OF ELK RIVER, MARYLAND.

[Printed in House Doc. No. 105, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 27, 1899.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of Elk River, Maryland, and I have the honor to submit herewith copies of reports dated, respectively, May 8, 1899, and November 13, 1899, by Gen. William F. Smith, United States agent, giving the results of said examination and survey.

Elk River was under improvement by the General Government at various times between the years 1873 and 1893, and as a result a navigable channel 100 feet wide and 8 feet deep was secured from deep water below Cedar Point to the bridge at Elkton. This channel has shoaled considerably, and it is the desire of those interested in the improvement that the channel be restored to the dimensions secured in 1893, i. e., 100 feet wide and 8 feet deep at mean low water. To do this will require the dredging of about 101,000 cubic yards of material, which, at 15 cents per yard, would cost $16,665, including contingent expenses. The cost of maintaining the improvement when completed is estimated at about $2,500 per annum.

In the judgment of General Smith this expenditure is justified by the commercial interests involved, and this opinion is concurred in by Division Engineer, Col. Peter C. Hains, Corps of Engineers.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF ELK RIVER, MARYLAND.

United States Engineer Office,
Wilmington, Del., May 8, 1899.

General: Under the provisions of the river and harbor act of March 3, 1899, and in compliance with Department letter of the 20th of March, I have the honor to submit the following report upon preliminary examination of Elk River, Maryland.

This river was improved by the Government between 1873 and 1884 and upon the completion of operations in the latter year there existed a channel 7 feet deep at mean low water, 80 feet wide through the bar at Cedar Point, and thence 70 feet wide to the bridge at Elkton, the head of navigation. In 1889, after a survey, in which the channel was found to have shoaled, a project was adopted for dredging the channel from the upper wharves at the bridge at Elkton to below Cedar Point to a depth of 8 feet and a width of 100 feet. This was completed in 1893 at a cost of $15,000.

An examination recently made shows that the channel has shoaled to 6 feet and less at some places and that the commerce has been maintained at what it was in 1888, a detailed report of which will be found in the Annual Report of the Chief of Engineers for 1890, pages 965–968. The desire of the people interested in the improvement is the restoration of the channel to the former project dimensions. No special increase of commerce is looked for thereby, but rather the maintenance of that which exists, as the more important industries there are largely dependent upon the channel for their shipments. One of these, the Singerly mills, is at present not in full operation, but it is reported that they will be soon.

I regard the river as worthy of improvement by the General Government to a limited extent; that is to say, to the extent of restoring it to former project dimensions, 8 feet deep and 100 feet wide, the cost of which can only be ascertained by a survey, which I recommend. The cost of this is estimated at $150.

I submit herewith a letter in regard to vessels navigating the river.

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., May 11, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I concur in the opinion of the district engineer that the river is worthy of improvement by the General Government to the extent of restoring the channel to 8 feet deep at mean low water and 100 feet wide.

I recommend that a survey be made, at the estimated cost of $150.

Peter C. Hains,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899,

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Elk River, Maryland.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 24, 1899.

Approved.

Elihu Root,
Secretary of War.

LETTER OF THE SCOTT FERTILIZER COMPANY.

Scott Fertilizer Company,
Elkton, Md., May 2, 1899.

Dear Sir: I have yours of the 1st instant, and note contents.

In reply to your question as to whether any vessels have been prevented coming up the river on account of the shoaling, will say that while I do not know of any vessels that have attempted to come up and have failed to do so, I do know that it is very difficult to get any vessels drawing even as little as 8 feet to make the attempt, as they all seem to know that the river has shoaled very much, and that they are liable to very serious delay caused by the necessity of waiting for favorable tides.

The steamer *Fannie*, drawing 8½ feet of water, which has been coming here every year since she was built, last fall had very great difficulty, and I doubt very much whether her owner will consent to send her here the coming season. The truth is, the river is practicably unnavigable for vessels drawing over 7 feet of water except on very favorable tides, and unless steps are taken promptly to dredge the river in another year navigation will have to be abandoned except by the very smallest class of vessels. It has been usual for us to charter barges drawing 8½ to 9 feet of water and carrying from 250 to 350 tons. This now is impossible. I hand you herewith a list of vessels which have been running here for us off and on for several years. I give their length, draft, and official number, as I do not quite understand whether you mean by the expression "tonnage" their registered tonnage or the number of tons we load on them. I give, however, the number of tons we have been accustomed to load. Of course this is only a small part of the entire number of vessels that come here. I sent you the Singerly list and have no copy, and if I had the copy, do not know the draft of the vessels. I presume you could get it approximately from the official registers.

Yours, truly,

Wm. H. Mackall,
Vice-President.

Mr. Geo. W. T. Miller,
Assistant Engineer.

List of vessels plying on Elk River, Maryland.

Tug *Gen. I. J. Wister;* length, 69.8 feet; draft, 8 feet; No. 85,930.
Tug *Roman;* length, 50.6 feet; draft, 7 feet; No. 95,632.
Steamer *Fannie;* loads 260 tons; length, 132 feet; draft, 8½ feet; No. 120,648.
Schooner *Edith W. Scott;* 75 tons; length, 61 feet; draft, 6½ feet; No. 135,767.
Schooner *Farmers Friend;* 90 tons; length, 70.6 feet; draft, 9 feet; No. 9,715.
Schooner *Caradora;* 125 tons; length, 74.1 feet; draft, 8 feet; No. 125,936.
Schooner *Bohemia;* 140 tons; length, 81 feet; draft, 8 feet; No. 3,291.
Schooner *Henry A. Jordan;* 100 tons; length, 70 feet; draft, 7½ feet; No. 95,681.
Schooner *Ella;* 130 tons; length, 73 feet; draft, 8½ feet; No. 136,139.
Schooner *Alice;* 140 tons; length, 74.8 feet; draft, 8½ feet; No. 106,125.
Jackson barges Nos. 2 and 3; length unknown; load brought here, 350 tons, drawing about 9 feet of water.
Barge *Violet;* length unknown; 359 tons brought, drawing 8½ feet.
Barge *Lotus;* length unknown; 252 tons, drawing 8½ feet.
Barge *Virginia;* length unknown; 324 tons, drawing 9 feet.

The barges *Violet*, *Virginia*, *Jackson No. 2*, and *Jackson No. 3* are all over 150 feet long, as they had to be towed out of here stern foremost and turned at the mouth of the Little Elk. The barge *Lotus* is about 130 feet long.

SURVEY OF ELK RIVER, MARYLAND.

United States Engineer Office,
Wilmington, Del., November 13, 1899.

General: I have the honor to submit the following report on a survey of Elk River, Maryland, made under the provisions of the river and harbor act of March 3, 1899, and in compliance with Department letter of August 25, 1899:

The preliminary examination was reported upon by me under date of May 8, 1899, and with it I submitted statistics of the commerce of the river and of the number and class of the vessels that ply there. I invite attention to them, as they apply at this date.

The survey was made last month by Mr. Charles M. Bird, civil engineer, inspector in this Department, and the results are indicated in the tracing[1] which I inclose herewith. The survey extended from the county bridge at Elkton downstream for a distance of about 14,000 feet, and up to the bridge on the Little Elk River (to the road bridge crossing that river), a distance of about 2,000 feet.

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[1] Not printed.

A description of the river will be found in the report on the survey made in 1889, published in the Annual Report of the Chief of Engineers for 1890, pages 967 and 968. Prior to that time $31,500 had been expended in the improvement of the river. The first work done was in 1874, when $5,000 were expended in building a dike 900 feet long on the northwest side of the channel, beginning about 1,100 feet below the bridge at Elkton, and in dredging to a width of 25 feet and a depth of 6 feet at mean low water in front of it and for about 300 feet below. Two years later the channel was made 40 feet wide from the bridge at Elkton to about one-half mile below. In 1881 work was begun on a project for a channel 80 feet wide through the bar near the mouth of the Little Elk River, and 70 feet wide thence to the bridge at Elkton, the depth being 7 feet at mean low water. This was completed in 1884.

The survey made in 1889 resulted in a project for a channel 100 feet wide and 8 feet deep at mean low water from deep water below Cedar Creek to the bridge at Elkton. This work was begun in 1891 and completed in 1893, at a cost of $15,000.

It will be observed by the tracing herewith that there is a good channel upstream to a point about 8,500 feet below Elkton, and that above that point the channel has shoaled considerably. The desire of those interested in the improvement is that the channel be restored to the dimensions made in 1893—100 feet wide and 8 feet deep at mean low water. To do this will require the dredging of about 101,000 cubic yards of material, which, at 15 cents per yard and an allowance for engineering expenses, will cost $16,665. The cost of maintaining the channel is estimated at about $2,500 a year. The commerce of the river, in my judgment, justifies the outlay, and I therefore recommend it. The principal commerce is that of the Singerly pulp mills and that of the Scott Fertilizing Company's works. The latter ship about 3,000 tons annually, carried by vessels drawing from 6½ to 8½ feet, and the pulp mills receive all their raw material, consisting usually of poplar wood, by water—about one vessel load daily. These vessels draw from 7 to 9 feet and carry from 40 to 100 cords each. The mills have for some time been closed, but preparations are now in progress for resuming work shortly.

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., November 15, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I concur in the opinions expressed by the district engineer.

Peter C. Hains,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

J 23.

PRELIMINARY EXAMINATION, WITH PLAN AND ESTIMATE OF COST OF IMPROVEMENT, OF ROCKHALL HARBOR, MARYLAND, WITH A VIEW TO OBTAINING A CHANNEL THROUGH SWAN POINT BAR AND IN THE INNER HARBOR 150 FEET WIDE AND 12 FEET DEEP, AND A CHANNEL 190 FEET WIDE AND 12 FEET DEEP ACROSS THE BAR.

[Printed in House Doc. No. 99, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, October 7, 1899.

Sir: The river and harbor act of March 3, 1899, provides for an examination and survey of Rockhall Harbor, Maryland, with a view to obtaining a channel through Swan Point Bar 150 feet wide and 12 feet deep, and a channel in the inner harbor of the same width and depth; also a channel 190 feet wide and 12 feet deep across the bar.

The duty of reporting upon this item of the act was assigned to the local officer, Gen. William F. Smith, United States agent, and I have now the honor to submit the accompanying copy of his report upon the subject, dated April 24, 1899, which contains a plan and estimate of cost of the proposed improvement.

It is estimated that the cost of dredging a channel 150 feet wide and 12 feet deep through Swan Point Bar would be $23,925, and in the inner harbor $19,140 additional. The biennial cost of maintenance is estimated at $8,320 for the outer channel and $888 for the inner harbor.

For a channel 190 feet wide and 12 feet deep across the bar the cost is estimated at $31,515, and to maintain this channel it is estimated that $8,320 will be required every two years.

The local officer is of opinion, concurred in by the division engineer, Col. Peter C. Hains, Corps of Engineers, and by me, that the harbor is worthy of improvement by the General Government.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

REPORT OF GEN. WILLIAM F. SMITH, UNITED STATES AGENT.

United States Engineer Office,
Wilmington, Del., April 24, 1899.

General: Under the provisions of section 22 of the river and harbor act approved March 3, 1899, and in compliance with Department instructions of the 15th ultimo, I have the honor to submit the following report on the preliminary examination of Rockhall Harbor, Maryland, with a view, as the act provides, to obtaining a channel through Swan Point Bar 150 feet wide and 12 feet deep, and a channel in the inner harbor of the same width and depth; also for a channel 190 feet wide and 12 feet deep across the bar.

In 1891, after a survey made under my direction, I recommended a channel 10 feet deep at mean low water and 100 feet wide from the channel in Swan Creek Inlet to the wharves at Rockhall, at an estimated cost of $9,513. The report thereon will be found in detail on pages 999–1003 in the Annual Report of the Chief of Engineers for 1892; and in 1895 Col. W. P. Craighill, Division Engineer, approved of dredging a cut across Swan Point Bar at a cost of $9,600, full report of which will be found in Annual Report of Chief of Engineers for 1895, pages 1162–1165.

The river and harbor act of June 3, 1896, made an appropriation of $16,600 for these improvements, and with that appropriation a channel 80 feet wide and 10 feet deep was made through Swan Point Bar and a channel 100 feet wide and 10 feet deep was made from Swan Creek Inlet to the wharves at Rockhall. This was done in 1897–98.

A recent examination shows that the inner work has maintained itself very well, the shoaling amounting to only about 3,000 cubic yards, which is at the rate of 4.6 per cent per annum. The outer cut was found to have shoaled to the extent of 27,300 cubic yards, which is at the rate of 30 per cent per annum. According to these figures, to maintain the outside channel for two years would require the removal of 41,600 cubic yards, and the inner harbor 4,440 cubic yards during the same period.

The estimated cost of dredging a channel 150 feet wide and 12 feet deep will be as follows:

Through Swan Point Bar:	
Dredging 145,000 cubic yards, at 15 cents	$21,750
Contingencies, 10 per cent	2,175
Total	23,925
Inner harbor:	
Dredging 116,000 cubic yards, at 15 cents	17,400
Contingencies, 10 per cent	1,740
Total	19,140

To maintain this channel will cost—the outer channel $8,320 and the inner harbor $888 every two years.

For a channel 190 feet wide, 12 feet deep across the bar, the estimated cost is as follows:

Dredging 191,000 cubic yards, at 15 cents	$28,650
Contingencies, 10 per cent	2,865
Total	31,515

To maintain this channel the cost will be $8,320 every two years.

The reasons given for the improvement of the channel from the Chesapeake Bay to Rockhall hold as well now as when the inner harbor was recommended by me in 1891, and the outer work by the division engineer in 1895. I inclose an extract from a report made to me in relation to the commerce of Rockhall. A survey is not required, the data in the office being sufficient.

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., April 27, 1899.

Respectfully submitted to the Chief of Engineers, U. S. A.

The commerce is general in character.

On the facts and reasons given by the district engineer and his assistant, together with my own knowledge of the locality, and on account of the present and prospective demands of commerce, I am of opinion that Rockhall Harbor, Maryland, is worthy of improvement by the General Government.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

EXTRACT FROM REPORT OF MR. GEO. W. T. MILLER, ASSISTANT ENGINEER.

The Chester River Steamboat Company is unstinted in its praises of this improvement and would use it exclusively if it were made safe. Their boat touches at Rockhall for the greater part of the year, one a day—from Baltimore one day and returning there the next. During the busy summer season the boat makes a round trip from and to Baltimore every day. They account Rockhall second in importance of their business points and report a steadily increasing trade. In 1891 they reported a business of $103,150 for Rockhall. This increased 32 per cent up to 1894, and they were obliged to make two round trips to Baltimore daily to handle the business in the busy season.

For 1897 the business is reported to have grown to $379,500, and the careful canvass of the town recently gave me figures remarkably close to these.

Besides the business by steamboat, there are about 40 vessels—sloops and schooners, from 5 to 40 tons—registered in the carrying trade, mostly carrying the oysters caught by about 200 small oyster boats to the Baltimore market. These boats all belong at Rockhall or vicinity, and represent a value of about $75,000.

The farming district which centers at Rockhall is very productive, and agricultural products to the value of $90,000 to $95,000 are annually shipped.

Oysters, fish, and crabs to the value of $96,500 are shipped annually, while general merchandise, to supply the twenty-odd stores of the neighborhood, valued at $130,000; lumber, $15,000; bricks, $750; fertilizers, $12,600; and coal, $10,000, are brought to Rockhall by water.

A canning establishment with a capacity of 30,000 cases is operated during the season, almost the entire output of which is shipped away.

All this traffic is necessarily by water, as the nearest railroad is at Chestertown, 9 miles distant. Rockhall is growing in size and numbers, too. The population is now estimated at 1,800, and during the last year about 50 new houses were built in the immediate vicinity.

The channel into the harbor terminates in the vicinity of the remains of an old pier where sailing packets from Annapolis, across the bay, landed passengers and goods in former times. Just prior to the dredging of the channel in 1897–98, a substantial pier and warehouse were built at the inner end of the channel and accommodations offered to attract shipping to this point, which is a mile nearer the business center of the town than the present landing in Swan Creek, where the steamboat at present touches, and connected therewith by an excellent road. None but a nominal wharfage has yet been charged, and the sailing craft are using the wharf more and more. At the time of the recent examination three schooners were discharging, one a cargo of coal and the other two brick. Negotiations with the steamboat company are now pending, with the aim of substituting the landing in the harbor for their present one in Swan Creek, or including the harbor landing in their present schedule with an increased service, which the steady growth of business seems to warrant. Such an arrangement will do away with a mile of hauling by team for all freight in the first case, and the second for at least 75 per cent of it.

J 24.

EXAMINATION AND SURVEY OF QUEENSTOWN HARBOR, MARYLAND.

[Printed in House Doc. No. 92, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 22, 1899.

Sir: The river and harbor act of March 3, 1899, provided for a preliminary examination and survey of Queenstown Harbor, Maryland, and on the 22d of March last W. F. Smith, United States agent, major of engineers, United States Army, retired, presented a report of such examination, a copy of which is submitted herewith. The locality being deemed worthy of improvement by the United States, the examination was followed by a survey made by Major Smith, and I have now the honor to submit the accompanying copy of his report of October 30, 1899, with map,[1] of the results of this survey.

The harbor of Queenstown has heretofore been improved by the United States, and in 1897 a channel 8½ feet deep and 100 feet wide was obtained.

The project now proposed contemplates increasing the dimensions of this channel so as to make it 10 feet deep and 200 feet wide, at an estimated cost of $23,100.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF QUEENSTOWN HARBOR, MARYLAND.

United States Engineer Office,
Wilmington, Del., March 22, 1899.

General: Under the provisions of section 22 of the river and harbor act approved March 3, 1899, and in compliance with your communication of the 15th instant calling for a report on the preliminary examination of Queenstown Harbor, Maryland, I have the honor to submit the following report:

Queenstown Harbor is on the eastern shore of Maryland, about 36 miles distant by water from Baltimore. It is the point of shipment for an extensive fertile region and the terminus of the Queen Anne's Railroad. Improvements have heretofore been made in the harbor by the General Government. In 1881 a channel was dredged to a depth of 8 feet at mean low water and a width of 100 feet, and in 1896 it was dredged to a depth of 8½ feet and a width of 100 feet from the Chester River, of which it may be said to be an arm, to the inner harbor, a distance of about 3,000 feet. The Chester River Steamboat Company runs a boat there twice a day and the Queen Anne's Railroad Company carries its freight and passengers to and from this point. The traffic of these companies alone last year was, I understand, over 27,000 tons, and the shipping, present and prospective, suggests the necessity for a depth of, say, 10 feet at mean low water and a width of from 100 to 150 feet. In my opinion, the harbor is worthy of improvement to that extent. I recommend a survey, the cost of which is estimated to be about $300.

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[1] Not reprinted. Printed in House Doc. No. 92, Fifty-sixth Congress, first session.

Very respectfully, your obedient servant,

WM. F. SMITH,
United States Agent.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., March 25, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

Based upon the facts and reasons given by the district engineer and my own knowledge of the present and prospective demands of commerce of Queenstown Harbor, I concur in the opinion of the district engineer that the harbor is worthy of improvement by the General Government.

As this harbor has already been improved at various times by the United States, and there are maps and records on file, I am of opinion that a sufficient survey can be made for the sum of $300.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Queenstown Harbor, Maryland.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

[Third indorsement.]

WAR DEPARTMENT.
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

LETTER FROM THE QUEEN ANNE'S RAILROAD COMPANY.

QUEEN ANNE'S RAILROAD COMPANY,
Baltimore, Md., July 27, 1899.

DEAR SIR: In compliance with instructions from the Chief of Engineers at Washington, I beg to hand you certain statistics with reference to the advisability of deepening, straightening, and widening the Queenstown channel, as asked for by the Queen Anne's Railroad Company. If any explanation shall be needed and you will telegraph me at my expense, I will wait upon you in Wilmington.

These statistics were made up to June 30, 1899.[1] We anticipate a much heavier business in the next three months (which is usually the case) than at any previous period of same duration. The fall crop of tomatoes, which has taken the place of peaches, will be the heaviest ever known in that section. We shall be obliged to barge the freight from there, and expect to begin in a very short time.

If we have any luck at all we shall certainly bring out 500,000 baskets of tomatoes, to say nothing of the usual excursion travel, which is heaviest during the month of August and part of September. The farmers anticipate the average crop of wheat, which will require to be moved, a great deal of it coming to this port.

The necessity for a straighter, wider, and deeper channel was never as great as now and will tend largely to increase our traffic. Our new boat will be ready in September.

I write this that you may take these facts into consideration in making your preliminary survey, and, if you so decide, you might recommend them to your Chief of Engineers for action at the next session of Congress in getting an appropriation.

Very truly, yours,

CHAS. H. TILGHMAN,
Vice-President.

Gen. WM. F. SMITH,
U. S. Engineer, United States Agent.

Statement of freight and passengers carried to and from points on the Queen Anne's Railroad from April, 1897, to September 30, 1899.

Berries	quarts	963, 994
Vegetables	packages	317, 939
Corn	bushels	165, 994
Wheat	do	243, 992
Fruit	packages	48, 481
Phosphates	tons	5, 497
Land lime	do	3, 650
Miscellaneous freights	do	13, 060
Total passengers		200, 477

During at least one-half of this period we operated about one-half of the 60 miles of railroad. The peach crop this year was a total failure and last year was not a success.

SURVEY OF QUEENSTOWN HARBOR, MARYLAND.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., October 30, 1899.

GENERAL: I have the honor to report on the survey of Queenstown Harbor, Maryland, made under the provisions of the river and harbor act of March 3, 1899, and in compliance with your instructions of August 25, 1899.

The preliminary examination of this harbor was reported upon by me under date of March 22, 1899. The survey was made last month under my direction by Mr. Oscar D. Ridings, civil engineer, inspector in this department, and the results are shown in the map which I inclose herewith. Queenstown Harbor was improved by the General Government between the years 1871 and 1881, and in the latter year a project for a channel 100 feet wide and 8 feet deep was completed from the Chester River to the steamboat wharf at Queenstown at an outlay of $14,000, and with an appropriation of $5,000 made by the river and harbor act of June 3, 1896, this channel was redredged in 1897, the depth then made being not less than 8½ feet at mean low water.

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[1] A later statement received from the company has been substituted.

The last appropriation, $3,000, made on the project which was completed in 1881 was applied to the straightening of the channel, and the main improvement needed now is the further straightening of the channel and an increase of the depth to 10 feet to meet the requirements of the increased and increasing traffic in the harbor, the Queen Anne's Railroad Company having since established its terminus there. For this purpose I recommend the channel indicated on the plan, which is 200 feet wide and 10 feet deep, the estimated cost of which is as follows:

Dredging 140,000 cubic yards, at 15 cents	$21,000
Engineering and contingent expenses, 10 per cent	2,100
Total	23,100

Two regular lines of steamboats ply between Baltimore and Queenstown, the Chester River Steamboat Company, which makes two trips daily, and the boats of the Queen Anne's Railroad Company, and other boats go there for grain, etc., from Baltimore. The steamboats draw between 7 and 9 feet. In 1898 the traffic amounted to 27,845 tons. No figures have been obtained for the present year. The officials of the Queen Anne's Railroad say that there has been an increase of 100 per cent in the business this year so far.

This business, as well as the fact that Queenstown Harbor is the terminus of a railroad which passes through a fertile country, in my opinion justifies the outlay I have herein recommended.

Very respectfully, your obedient servant,

WM. F. SMITH,
United States Agent.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., October 31, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I concur in the recommendation of the district engineer.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

J 25.

EXAMINATION AND SURVEY OF CLAIBORNE HARBOR, MARYLAND.

[Printed in House Doc. No. 81, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 15, 1899.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of Claiborne Harbor, Maryland, and I have the honor to submit herewith report of examination, dated June 1, 1899, and report of October 26, 1899, with map,[1] of survey of this locality made by William F. Smith, United States agent, major of engineers, U. S. A., retired.

The plan of improvement proposed in the report of October 26 provides for dredging a channel 12 feet deep at mean low water, at an estimated cost of $17,490. An estimate of $2,500 is also submitted for an extension of the existing jetty, but the extension of this jetty work is not advised unless it shall hereafter be found necessary.

It is the opinion of Major Smith and of Col. Peter C. Hains, Corps of Engineers, division engineer, that the commercial interests involved make Claiborne Harbor worthy of improvement. I concur in the views of these officers.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF CLAIBORNE HARBOR, MARYLAND.

United States Engineer Office,
Wilmington, Del., June 1, 1899.

General: Under the provisions of the river and harbor act of March 3, 1899, and in compliance with Department letter of March 20, 1899, I have the honor to submit the following report upon the preliminary examination of Claiborne Harbor, Maryland.

The examination was made by Mr. Charles M. Bird, of this Department, and his report, accompanied by a letter from the general superintendent of the Baltimore, Chesapeake and Atlantic Railway Company, is inclosed herewith. From this report it appears to me that the commercial interests involved, present and prospective, warrant the improvement of the harbor by the General Government, the extent of which can be determined by a survey, which I recommend, and the cost of which is estimated at $200.

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

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[1] Not reprinted. Printed in House Doc. No. 81, Fifty-sixth Congress, first session.

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., June 3, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

Basing my views upon my own knowledge of this locality, as well as the facts and reasons given in this report, I am of opinion that the present and prospective demands of commerce make Claiborne Harbor worthy of improvement by the General Government. The survey is recommended.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Claiborne Harbor, Maryland.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

REPORT OF MR. C. M. BIRD, INSPECTOR.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., May 31, 1899.

GENERAL: In obedience of your orders of May 3, I have the honor to submit the following report of the preliminary examination of Claiborne Harbor, Maryland:

Claiborne is on a point on the eastern shore of Eastern Bay, an estuary of Chesapeake Bay, about 6 miles due east from Bloody Point Light-House, on Chesapeake Bay.

Eastern Bay has an area of about 50 square miles. It is largely covered with natural oyster beds, which give employment to large numbers of men and boats during the oyster season. As the harbor is exposed to northwest to northeast winds, these boats at present have no safe harbor here and are forced to seek shelter at a distance from the oyster grounds, causing a large loss of time.

Claiborne is the western terminus of the Baltimore, Chesapeake and Atlantic Railway Company. This railway traverses the Eastern Shore of Maryland from Claiborne to Ocean City, on the Atlantic Ocean. The railway makes connection with the city of Baltimore by steamboats. These are large and comfortable boats of about 800 tons capacity, drawing about 10 feet of water. One round trip is made daily during the year, and during the summer and fall two round trips daily. They carry large numbers of passengers and a large amount of freight. There are, however, large quantities of freight that will not pay for all-rail transportation that would be shipped by sailing vessels if there was a harbor here.

The railway company has constructed at Claiborne a wharf and landing pier, the total length from the shore being about 1,200 feet. Six hundred feet of this wharf, on which two tracks are laid, is a solid embankment. It is about 70 feet in width, is protected on the eastern side by piling bulkhead, and is about 6 feet above high water. The outer pier, about 600 feet long, is built on piling and is filled to high water with heavy furnace slag and oyster shells.

Dredging amounting in cost to about $23,000 has been done at various times by the railway company alongside of their wharf and to deep water in the bay. This channel appears to maintain its depth. The material encountered is a sandy clay.

There are four houses on the western side of the wharf and pier, used for opening and packing oysters during the season, the railway company allowing the use of the wharf free of cost.

The improvement desired is that the present channel be widened by dredging from the 12-foot curve in the bay to about the 3 or 4 foot curve inshore, with a width of 300 feet and a low-water depth of 12 feet; also a breakwater for protection of the dredged channel beyond the present wharf. The total length of dredging required will be about 1,500 feet; the length of breakwater about 300 feet. This improvement will give a good harbor of refuge for a large number of small vessels, and is badly needed by them. The dredging already done by the railway company is included in this channel.

A survey will be needed to determine the actual amount of dredging required.

From a statement by Mr. T. A. Joynes, general superintendent of the Baltimore, Chesapeake and Atlantic Railway Company, which is appended hereto, the amount of freight carried, east and west, by their steamers during the year 1898 was as follows:

General freight	tons..	35, 220
Coal	do...	8, 000
Lumber and ties	feet..	200, 000
United States mail	pounds..	108, 000
Passengers carried		54, 000

There are at present no vessels belonging to the port of Claiborne, owing to the want of protection. A small business is done by sailing vessels, however, and with a protected harbor it would rapidly increase.

From the limited examination I was enabled to make I am of the opinion that a depth of channel of 10 feet at mean low water would be ample for the present needs, and would afford a safe harbor for a large fleet of small oyster and other sailing craft that have no protection here at present.

From the large public interests that will be benefited by the improvement, and the probable small cost, I should judge it to be worthy of improvement by the Government.

The cost of a survey of the locality would be about $200.

I am, sir, very respectfully, your obedient servant,

C. M. Bird, *Inspector.*

Gen. Wm. F. Smith,
United States Agent.

LETTER OF THE BALTIMORE, CHESAPEAKE AND ATLANTIC RAILWAY COMPANY.

Baltimore, Chesapeake and Atlantic Company,
Office of the General Superintendent,
Baltimore, May 24, 1899.

My Dear Sir: I beg to say that what we want at Claiborne is a channel 300 feet wide from the end of the railroad pier out to the natural channel, which would be a cut of about 1,500 feet long and made to a depth of 12 feet at mean low water, and a breakwater from the end of oyster-house pier, on the northwest side of channel, running out about 300 feet in a southwesterly direction to protect the channel from sediment that is liable to wash into the channel when the wind is from a northerly direction.

The above, I think, will cover the needs of Claiborne.

The amount of business done at Claiborne (1898) is as follows (this, of course, is approximated):

Freight	tons..	35, 220
Passengers		54, 000
Coal	tons..	8, 000
Lumber and ties	feet..	200, 000
United States mail	pounds..	108, 000

Daily trip of one steamer in winter.

Two trips, daily, of passenger steamer in summer, with daily trip of freight steamer.

For fiscal year ending August 31, 1899, you can safely add 25 per cent to the above amounts.

There is a great demand for shipments of coal via Claiborne from northern markets to consumers along the line of the Baltimore, Chesapeake and Atlantic Railway, the difference in freight being from 45 to 50 cents in favor of Claiborne.

As to lumber, wood, cross-ties, etc., it would afford a much-needed outlet for these commodities, which now have to go by all rail, if at all, the cost of which is so great that the shipments are light; but with improvements asked for at Claiborne the increase would be from 100 to 200 per cent annually, and it would be a great benefit to farmers and merchants all along the line of the Baltimore, Chesapeake and Atlantic Railway, who now depend upon rail transportation for marketing their goods of all kinds. The oyster industry is another factor for better water facilities at Claiborne. Claiborne is situated on the southeastern part of Eastern Bay, at the terminus of the Baltimore, Chesapeake and Atlantic Railway, and Eastern Bay is 4 miles wide and 6 to 8 miles long and its bottom is a natural oyster bed.

With a suitable channel at Claiborne and a harbor of refuge for oyster boats, the increase in this industry alone would be immense, as it would be one hour's sail from the oyster grounds to Claiborne market, instead of a day's sail to the Baltimore market. The advantage the oystermen would have with a good entrance to Claiborne can be readily seen. The oystermen could work every day on the oyster grounds, thereby saving the expense of a losss of two days of the vessel and crew going to and coming from Baltimore. Again, taking the peninsula from Cape Charles to Baltimore, there are located three terminals of railroads—one at Cape Charles, one at Crisfield (both terminals of the New York, Philadelphia and Norfolk Railroad Company), on which have been spent large sums for improvement to the harbor. The distance from Cape Charles to Crisfield is about 60 miles. The distance from Crisfield to Claiborne is about 75 miles. Claiborne is the terminal of the Baltimore, Chesapeake and Atlantic Railway Company, a road crossing the peninsula to Ocean City, passing through a rich and growing section of country, connecting the towns of St. Michael, Easton, Preston, Hurlocks, Vienna, Mardella Springs, Salisbury, Pittsville, Whaleyville, Berlin, and Ocean City with Baltimore. These three points are the only important water outlets for vessels on the eastern side of the Chesapeake Bay, and are the only railroad terminals. In looking over the map of the "Eastern Shore," the importance of a suitable channel and harbor of refuge at Claiborne for the accommodation of traffic, similar to that at Cape Charles and Crisfield, will be readily seen, so that the people in the upper and larger section of the peninsula may enjoy some of the advantages of those in the lower and narrower section.

The importance of this channel to the people of this large area of country has been so evident to the Baltimore, Chesapeake and Atlantic Railway Company that they have, on more than one occasion, spent considerable money and had the channel deepened to acccommodate the growing business.

Trusting that this will give you all the information desired, I am,

Very truly, yours,

T. A. Joynes,
General Superintendent.

C. M. Bird, Esq.,
Seaford, Del.

SURVEY OF CLAIBORNE HARBOR, MARYLAND.

United States Engineer Office,
Wilmington, Del., October 26, 1899.

General: In compliance with Department instructions of August 25, 1899, I have the honor to submit the following report on the survey of Claiborne Harbor, Maryland:

A preliminary examination was reported upon by me on June 1, 1899, and therein will be found a description of the harbor and its commerce. The survey was made last month, under my direction, by Mr. Charles M. Bird, civil engineer, and the results of the survey are indicated in the tracing which I inclose herewith. It shows also the improvement which is recommended by me. This is for dredging a channel 12 feet deep at mean low water and 300 feet wide from the 12-foot contour in Eastern Bay to the railroad pier in the harbor, a distance of about 1,900 feet, and thence shoreward along the south side of the pier to a width of 195 feet for a length of 500 feet.

It is estimated that this improvement will require the dredging of 106,000 cubic yards of material, which, at an estimated cost of 15 cents per yard and an allowance of 10 per cent for engineering and contingent expenses, will amount to $17,490. It may also be necessary hereafter to build a jetty—an extension of the present jetty—for a length of about 250 feet, to protect the channel from the drifting sand, the cost of which is estimated at $2,500. I include this in the estimate, but do not advise that it be built unless it shall be found necessary.

This improvement will provide a proper channel for the class of steamers plying there and give a good harbor for the large fleet of oyster and other sailing craft that at present have no suitable place for anchorage.

The main commerce in Claiborne Harbor at present is due to its being the terminus of the Baltimore, Chesapeake and Atlantic Railway Company, whose steamers alone carried 44,025 tons of general freight, 67,500 passengers, 250,000 feet of lumber, 110,000 pounds of United States mail, and 9,000 tons of coal in the year ending August 31, 1899, as reported by the general superintendent of the company.

The importance of the harbor and its commerce, as above stated, in my judgment, justifies the improvement herein recommended.

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

J 26.

EXAMINATION AND SURVEY OF TYASKIN (WETIPQUIN) CREEK, MARYLAND.

[Printed in House Doc. No. 109, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 27, 1899.

Sir: The river and harbor act approved March 3, 1899, makes provision for preliminary examination and survey of Tyaskin Creek, Maryland. This stream is also known as Wetipquin (Wetipkin) Creek or River. The examination and survey authorized by the act were made by Gen. William F. Smith, United States agent, and I have the honor to submit herewith copies of reports thereon submitted under date of March 23, 1899, and November 14, 1899, with map[1], respectively.

In report of survey General Smith states that to meet the requirements of vessels now seeking entrance into this creek will require a depth of 9 feet at mean low water and a width of 120 feet. This involves the dredging of 80,000 cubic yards of material, which, at 15 cents per cubic yard and an allowance for engineering and contingent expenses, will cost $13,200.

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[1] Not reprinted. Printed in House Doc. No. 109, Fifty-sixth Congress, first session.

In the opinion of the local officer the improvement proposed is justified, if not by the present commerce, by that which may reasonably be looked for afterwards, and his views are concurred in by the Division Engineer, Col. Peter C. Hains, Corps of Engineers, on account of the small amount required to do the necessary work.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF TYASKIN (WETIPQUIN) CREEK, MARYLAND.

United States Engineer Office,
Wilmington, Del., March 23, 1899.

General: Under the provisions of section 22 of the river and harbor act of March 3, 1899, and in compliance with Department letter of March 15, 1899, calling for a preliminary examination of Tyaskin Creek, Maryland, I have the honor to submit the following report:

Tyaskin Creek and Wetipquin River are identical. Under the latter name a preliminary examination was made of it under my direction in 1888. The conditions then existing with reference to the advisability of improving its mouth are unchanged, and I adhere to the recommendation then made for dredging a channel 100 feet wide and 8 feet deep at mean low water for a length of about 800 feet, as I believe that the improvement is fully justified in the interests of commerce. This will give an excellent harbor for small vessels and will, in addition, open up 5 miles of the stream for navigation.

A survey, which I recommend, will cost about $250.

For details, I invite attention to the report of Assistant Engineer Stierle, printed in Annual Report of the Chief of Engineers for 1889, pages 910-911, a copy herewith.[1]

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., March 28, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

Basing my judgment on the facts and reasons given by the district engineer and his assistant, I am of opinion that the Wetipquin River is worthy of improvement by the General Government, on account of the present and prospective demands of commerce.

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[1] Not reprinted.

The recommendation of the district engineer that an allotment of $250 for a survey be made is recommended for approval.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Tyaskin Creek (Wetipquin River), Maryland.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

SURVEY OF TYASKIN (WETIPQUIN) CREEK, MARYLAND.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., November 14, 1899.

GENERAL: I have the honor to submit the following report on the survey of Tyaskin Creek (Wetipquin River), Maryland, made under the provisions of the river and harbor act of March 3, 1899, and in compliance with Department instructions of August 25, 1899.

The survey was made during the month of September, 1899, by Mr. Oscar D. Ridings, civil engineer, inspector in this Department, and extended from deep water in the Nanticoke River to about 1,000 feet above the steamboat wharf, a total distance of about 7,000 feet. A description of Tyaskin Creek will be found published in the Annual Report of the Chief of Engineers for 1889, pages 910 and 911. The conditions at the bar at the mouth have, however, been found in the survey to be different from those stated therein. To give a channel 100 feet wide and 8 feet deep at mean low water at this time will require dredging for a length of about 2,900 feet.

The results of the survey are indicated in the tracing which I inclose herewith. To meet the requirements of vessels now seeking entrance into Tyaskin Creek will require a depth of 9 feet at mean low water and a width of 120 feet. This involves the dredging of 80,000 cubic yards of material, which, at 15 cents per cubic yard and an allowance for engineering and contingent expenses, will cost $13,200. The present commerce is not large, the obstruction at the bar, which is sought by those interested to be removed, almost preventing it; but, notwithstanding, several schooners trade regularly on the creek, and large quantities of farm products, oysters, etc., are shipped, in addition to the business done by the Baltimore, Chesapeake and Atlantic Steamboat line, which stops in the channel opposite the mouth and receives and discharges freight for Tyaskin Creek three times a week. The actual figures I have been unable to obtain. They are believed, however, to be substantially as was stated in my report in 1888, above referred to.

I believe the opening of navigation in this creek is justified, if not by the present commerce, by that which may reasonably be looked for by this improvement, in addition to affording a channel for a regular line of steamboats now in operation. They draw about 8 feet. I therefore recommend the improvement.

Very respectfully, your obedient servant,

Wm. F. Smith,
United States Agent.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

(Through the Division Engineer.)

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., November 15, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I concur in the views of the district engineer that the improvement is justified by the small amount required to make it.

Peter C. Hains,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

J 27.

PRELIMINARY EXAMINATION FOR DREDGING CHANNEL LEADING TO TANGIER ISLAND, IN TANGIER SOUND, VIRGINIA.

[Printed in House Doc. No. 42, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington November 28, 1899.

Sir: I have the honor to submit the accompanying copy of report of May 9, 1899, by W. F. Smith, United States agent, major of engineers, United States Army, retired, upon a preliminary examination with a view to dredging a channel leading to Tangier Island, in Tangier Sound, Virginia, under the provisions of the river and harbor act approved March 3, 1899.

It is the opinion of Major Smith, concurred in by Col. Peter C.

Hains, Corps of Engineers, the division engineer, and by me, that the locality is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF GEN. WILLIAM F. SMITH, UNITED STATES AGENT.

UNITED STATES ENGINEER OFFICE,
Wilmington, Del., May 9, 1899.

GENERAL: Under the provisions of the river and harbor act of March 3, 1899, and in compliance with Department letter of March 20, I have the honor to submit the following report upon preliminary examination for "dredging channel leading to Tangier Island, in Tangier Sound, and ascertain most feasible channel for improvement."

There is a direct channel, which is used by steamboats and other vessels, leading to Tangier Island, in Tangier Sound. It is that into Cod Harbor, and is of ample width and depth to the landing place, which is an isolated pier about the center of the harbor. Communication thence with the island is by means of small boats.

It appears to be the desire of the inhabitants of the island to have a channel with a width of 100 feet and a depth of 7 feet at mean low water dredged from the landing pier to the shore, a distance of about 2,500 feet. A report upon this was made by me in 1891, and will be found in the Annual Report of the Chief of Engineers for that year, pages 1207–1208. The conditions now are the same as then. I adhere to the opinion then given that the proposed improvement is not worthy of being undertaken by the Government.

Very respectfully, your obedient servant,

WM. F. SMITH,
United States Agent.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., May 11, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I am of opinion that this locality is not worthy of improvement by the General Government.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

APPENDIX K.

IMPROVEMENT OF PATAPSCO RIVER AND BALTIMORE HARBOR, MARYLAND.

REPORT FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS. OFFICERS IN CHARGE, LIEUT. COL. O. H. ERNST AND LIEUT. CHARLES W. KUTZ, CORPS OF ENGINEERS.

IMPROVEMENTS.

1. Patapsco River and channel to Baltimore, Md.
2. Channel to Curtis Bay, in Patapsco River, Baltimore Harbor, Maryland.
3. Harbor of Southwest Baltimore (Spring Garden), Maryland.
4. Removing sunken vessels or craft obstructing or endangering navigation.

HARBOR LINES.

5. Baltimore Harbor and Patapsco River, Maryland.
6. Curtis Bay, Baltimore Harbor, Maryland.

United States Engineer Office,
Baltimore, Md., July 14, 1900.

General: I have the honor to forward herewith the annual reports for the year ending June 30, 1900, for the works of improvement of rivers and harbors in my charge.

Very respectfully, your obedient servant,

O. H. Ernst,
Lieut.-Col., Corps of Engineers, U. S. A.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

K 1.

IMPROVEMENT OF PATAPSCO RIVER AND CHANNEL TO BALTIMORE, MARYLAND.

As authorized by the law of March 3, 1899, a continuing contract for dredging, involving $1,000,000, was entered into June 12, 1899, to obtain a channel 30 feet deep at mean low water, with a bottom width of 600 feet, widened in the bends, and side slopes of 3 base to 1 vertical, from Fort McHenry to the deep water in the Chesapeake Bay near Sandy Point Light-house.

Under a former contract the channel had been dredged to 30 feet deep at mean low water for a width of 230 feet in the Fort McHenry, Brewerton, and Craighill divisions, and 250 feet in the Cut-off division.

Work under the existing contract commenced September 12, 1899, with a small plant, which was gradually increased to a large one, and operations have been vigorously prosecuted. The contractor has five large dredges on the work, one of them (of the "clam-shell" type) having removed 225,528 cubic yards of material in the working days of one calendar month, and the whole five, 598,816 cubic yards in the same month. The contractor proposes to increase the plant already at work, and to complete the contract by December 31, 1901. This will require an appropriation of $475,352 to meet payments under the contract, and $50,000 for maintenance in the fiscal year ending June 30, 1902, as provided for in the adopted project.

During the fiscal year ending June 30, 1900, the contractor has dredged 1,959,773 cubic yards of material and deposited it on the usual dumping grounds in the Chesapeake Bay. This has resulted in giving a depth of 30 feet at mean low water for a width of from 330 to 480 feet in the Fort McHenry division of the main ship channel; from 275 to 320 feet width in the Brewerton division; from 290 to 450 feet width in the Cut-off division, and from 330 to 380 feet width in the Craighill division.

The U. S. steamer *Sentinel*, belonging to the improvement, has been in commission for this work as well as for all others in the district, the steam tender *Runaway* having been sold.

Money statement.

July 1, 1899, balance unexpended		$218,924.73
Amount appropriated by sundry civil act approved June 6, 1900		324,648.00
		543,572.73
June 30, 1900, amount expended during fiscal year		110,906.44
July 1, 1900, balance unexpended		432,666.29
July 1, 1900, outstanding liabilities	$2,000.00	
July 1, 1900, amount covered by uncompleted contracts	730,969.02	
		732,969.02
Amount (estimated) required for completion of existing project		1,575,352.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$475,352.00	
For maintenance of improvemeut	50,000.00	
		525,352.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

The following are the amounts and dates of appropriations for improving harbor at Baltimore, Md., including Patapsco River:

August 30, 1852	$20,000	June 14, 1880	$100,000
August 15, 1856	100,000	March 3, 1881	150,000
June 28, 1864	20,000	August 2, 1882	450,000
June 23, 1866	5,200	July 5, 1884	250,000
March 3, 1867	75,000	August 5, 1886	150,000
July 25, 1868	17,000	August 11, 1888	300,000
April 10, 1869	26,730	September 19, 1890	340,000
July 11, 1870	42,900	March 3, 1891	151,200
March 3, 1871	50,000	August 5, 1892	208,000
June 10, 1872	100,000	August 18, 1894	50,000
March 3, 1873	200,000	June 3, 1896	400,000
June 23, 1874	75,000	June 3, 1896	50,000
March 3, 1875	75,000	March 3, 1899	200,000
August 14, 1876	75,000	June 6, 1900	324,648
June 18, 1878	75,000		
March 3, 1879	160,000	Total	4,240,678

CONTRACT IN FORCE.

Continuous contract in force during the fiscal year with Simon Hess, approved July 5, 1899, commenced September 12, 1899, and the contract time for completion is June 30, 1903.

COMMERCIAL STATISTICS.

Commercial statistics of the port of Baltimore, Md., comparing the fiscal years ended June 30, 1899 and 1900.

Imports.	Free.	Dutiable.	Total.
1899	$4,636,021	$4,515,138	$9,151,159
1900	12,026,474	7,016,507	19,042,981
Increase in 1900	7,390,453	2,501,369	9,891,822

IMPORTS.

In American vessels in 1900:	
Sailing	$1,993,708
Steam	110,199
In foreign vessels in 1900:	
Sailing	263,971
Steam	16,658,081
In cars overland	17,022
Total	19,042,981

DOMESTIC EXPORTS.

1899	$107,099,201
1900	115,432,167
Increase in 1900	8,332,966
In American vessels in 1900:	
Sailing	881,355
Steam	11,448
In foreign vessels in 1900:	
Sailing	230,611
Steam	114,308,753

Recapitulation.

In American vessels in 1900	$892,803
In foreign vessels in 1900	114,539,364
Total exports in 1900	115,432,167

Principal articles exported.

	Tons.		Tons.
Cattle	39,615	Beef products	15,438
Grain	1,426,014	Pork products	34,793
Flour	266,875	Lard	51,094
Coal	383,859	Oleomargarine	19,510
Copper	44,523	Starch	7,708
Cotton, unmanufactured	43,660	Rosin	21,940
Glucose	18,861	Tobacco	41,494
Iron and steel	194,872	Wood, and manufactures of	235,585
Oil cake	51,143	Oils	152,957

Amount of duties collected in 1900	$2, 722, 039. 51
Miscellaneous customs receipts in 1900	127, 526. 02
Total receipts in 1900	2, 849, 565. 53
Total receipts in 1899	2, 100, 792. 77
Increase in 1900	748, 772. 76
Duties on merchandise in bond in 1899	238, 641. 05
Duties on merchandise in bond in 1900	176, 971. 35
Decrease in 1900	61, 669. 70

Summary of duties collected in 1900.

Imports and miscellaneous customs receipts	$2, 849, 565. 53
Merchandise in bond	176, 971. 35
Merchandise transported with appraisement	38, 861. 64
Total	3, 065, 398. 52

Statistical recapitulation.

Dutiable imports have increased	$2, 501, 369. 00
Free imports have increased	$7, 390, 453. 00
Domestic exports have increased	$8, 332, 966. 00
Tonnage (foreign) has increased ... tons..	108, 360
Duties collected have increased	$748, 772. 76
Duties on merchandise in bond have decreased	$61, 669. 70
Duties on merchandise in bond with and without appraisement have increased	$1, 936. 27

Tonnage movement.

	Number of vessels.		Tonnage.	
	1898-99.	1899-1900.	1898-99.	1899-1900.
Foreign trade:				
Entered	893	911	1, 605, 090	1, 677, 383
Cleared	941	925	1, 729, 202	1, 775, 269
Coasting trade:				
Entered	1, 332	1, 544	1, 673, 401	2, 022, 848
Cleared	1, 937	2, 257	2, 035, 927	2, 466, 080

Number of immigrant passengers.

	Male.	Female.	Total.
1898-99	10, 296	5, 255	15, 551
1899-1900	20, 817	6, 747	27, 564

Vessels built in 1899-1900.

	Number.	Gross tons.	Net tons.	Value.
Steam	15	13, 875	10, 021	$1, 775, 500
Sail	19	1, 804	1, 549	71, 125

Established lines of steamships.

	Number.	Tonnage.	Destination.
Johnston Line	5	22,635	Liverpool.
Blue Cross Line	1	2,979	Havre.
Donaldson Line	7	22,113	Glasgow.
Puritan	4	9,060	Antwerp.
Atlantic Transport Line	7	13,182	London.
Lord Line	12	28,788	Belfast and Dublin.
Hamburg-American Line	25	81,565	Hamburg.
Empire	4	6,622	Leith.
North German Lloyds	9	81,675	Bremen.
Neptune	9	18,983	Rotterdam.
Buckman	3	1,409	Jamaica.
Do	3	2,275	Bocas del Torre.
West India Fruit Co	3	1,349	Jamaica.
Earn Line	10	15,088	Cuban ports.
Total tons	....	251,176	

New lines: Buckman Line to Bocas del Torre.

The following lines have reduced the number of vessels:

Johnston Line	1
Atlantic Transport Line	3
North German Lloyd	7
Donaldson Line	1
Puritan Line	1
Total	13

The following lines have added to the number of vessels:

West India Fruit Co	2
Neptune Line	1
Lord Line	2
Hamburg-American	1
Empire Line	1
Earn Line	5
Buckman Line	1
Total	13

The tonnage movement at this port shows an increase of over 4 per cent over that of last year. With the exception of the falling off in wheat, this year has exceeded all others in the history of this port in the export of domestic products. Our shipyards are still working at full capacity and the future is quite promising. The construction of the two steamships *Pleiades* and *Hyades* at the Maryland Steel Company's works marks a departure from the usual type of vessels heretofore built, and will place Baltimore built vessels among those engaged in the ocean carrying trade. The *Hyados* is now en route to Europe with 5,000 tons grain. The prospects for the improvement of the South West Branch of the Patapsco River (Spring Gardens) is now very flattering, and when completed will largely increase our harbor facilities. There are now fourteen established lines of steamships trading at this port, having an aggregate carrying capacity of 437,000 tons.

Respectfully, yours,

Wm. F. Stone, *Collector*.

Lieut. Col. Oswald H. Ernst, U. S. A.,
In charge Improvement Patapsco River, etc.

K 2.

IMPROVEMENT OF CHANNEL TO CURTIS BAY, IN PATAPSCO RIVER, BALTIMORE HARBOR, MARYLAND.

The commencement of the erection of extensive coal wharves at Curtis Bay, to relieve the overcrowded condition of the main harbor at Baltimore, made it advisable to use the balance of funds available toward giving the channel the dimensions provided for in the adopted project. Accordingly, a contract was entered into March 9, 1900, for the expenditure of $12,000 in dredging. With this sum 97,641 cubic yards of material were excavated with one dredge between March 30 and June 20, 1900, completing the contract. The channel is now 27 feet deep at mean low water for a width of 70 feet and 25 feet deep at mean low water for a width of 150 feet.

Money statement.

July 1, 1899, balance unexpended	$12,000.00
June 30, 1900, amount expended during fiscal year	11,861.93
July 1, 1900, balance unexpended	138.07
July 1, 1900, outstanding liabilities	138.07
Amount (estimated) required for completion of existing project	45,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	45,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

The following are the amounts and dates of appropriations for improving channel to Curtis Bay, in Patapsco River, Baltimore Harbor, Maryland:

July 13, 1892	$28,000.00
August 18, 1894	12,000.00
Total	40,000.00

Abstract of proposals for dredging Curtis Bay, Maryland, opened at Baltimore, Md., noon of February 26, 1900.

No.	Name and address of bidder.	Price per cubic yard.	Total cost (estimated quantity, 100,000 cubic yards).
		Cents.	
1	Sanford & Brooks Co., Baltimore, Md	12	$12,000
2	Baltimore Dredging Co., Baltimore, Md	11	11,000

CONTRACT IN FORCE.

A contract was in force during the fiscal year with the Baltimore Dredging Company, dated March 9, 1900, approved March 20, 1900, commenced March 30, 1900, and completed June 20, 1900.

K 3.

IMPROVEMENT OF HARBOR OF SOUTHWEST BALTIMORE (SPRING GARDEN), MARYLAND.

Nothing has ever been done on this work.

Money statement.

July 1, 1899, balance unexpended	$5,000.00
July 1, 1900, balance unexpended	5,000.00

Amount (estimated) required for completion of existing project	309,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902	100,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

The following is the amount and date of appropriation for improving harbor of Southwest Baltimore (Spring Garden), Maryland:

June 23, 1896	$5,000

K 4.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Canal boat Hero.—This canal boat, loaded with oyster shells, sunk in the Chesapeake Bay, off Pooles Island, in 18 feet of water and was an obstruction to navigation. The vessel had been abandoned by the owner. The wreck was entirely removed January 17–20, 1900, by the use of dynamite and the services of the U. S. steam tender *Sentinel*, at a cost of $150.

Schooner Cecil.—This schooner was sunk as a result of a collision, and was abandoned by the owners. The wreck was near the main ship channel in the Patapsco River, and was an obstruction to navigation. The dredge *Defender*, operating in the vicinity, raised the wreck bodily, and both were towed to Baltimore Harbor, where the wreck was deposited behind the pierhead line. The cost of the operation was $50.

K 5.

ESTABLISHMENT OF HARBOR LINES IN PATAPSCO RIVER AND BALTIMORE HARBOR, MARYLAND.

United States Engineer Office,
Baltimore, Md., April 14, 1900.

General: I have the honor to submit the following report on the proposed establishment of harbor lines in Baltimore Harbor and Patapsco River, Maryland.

In accordance with instructions contained in the first indorsement on my letter dated February 6, 1900, the following letter was prepared and mailed to about 200 of the most prominent vessel owners, wharf owners, and business men in Baltimore:

United States Engineer Office,
Baltimore, Md., February 23, 1900.

Dear Sir: In the river and harbor act approved March 3, 1899 (section 10), it is held that the term "established harbor lines" refers only to such lines as may have been approved by the Secretary of War. It is therefore proposed to submit the lines heretofore established by the city of Baltimore, both within and without the city limits, to the Secretary of War for his approval. Before doing so, however, a public hearing will be held in this office at 10 o'clock a. m., March 9, 1900, at which time all interested parties are invited to be present and express their views.

Very respectfully,

CHARLES W. KUTZ,
First Lieut., Corps of Engineers,
United States Army.

At the public hearing provided for, the following were present:

Walter B. Brooks, jr., of the Canton Company and Merchants and Manufacturers' Association.
R. Ramsay, of the Merchants and Manufacturers' Association and Patterson, Ramsay & Co.
John Murdoch, light-house department and Baltimore and Chesapeake Steamboat Company.
W. G. Coughlin, of the Northern Central Railway Company.
William Conway, of the Baltimore Chrome Works.
C. H. Forrest, secretary Merchants and Manufacturers' Association.
E. S. Geary, chairman of committee of Merchants and Manufacturers' Association.
W. Ancker, of the Baltimore and Ohio Railroad Company.
J. D. McCubbin, of the Baltimore and Ohio Railroad Company.
N. H. Hutton, engineer of harbor board of city of Baltimore.

The object of the hearing was made known, and those present were invited to express their views. This was done in an informal manner. The suggestions made were chiefly requests to advance the lines in certain places, notably along Clinton street and Boston street. Numerous other minor changes were discussed.

In preparing the plans these suggestions, so far as they met with the approval of the engineer of the city harbor board, were adopted, as they will tend to promote rather than retard the interests of navigation. With these exceptions, the lines which I have indicated in red on the accompanying tracings[1] conform closely to those heretofore established by the city. They are not identical, because in many places, for the sake of simplicity, small reentrant angles have been eliminated.

No bulkhead line is indicated, as the present practice is to build solid structures out to the pierhead line. There is, moreover, no objection to this custom, as the maintenance of the dredged channel is not dependent on the maintenance of a definite tidal prism.

The area covered by these lines has been plotted on three sheets. Sheets I and II, being entirely within the city limits and covering, therefore, the most important area, are made on a scale of 1 : 2,400, while sheet III is on a scale of 1 : 7,200.

The harbor stones, to which the points of deflection in the pierhead line are referred, are of granite with a top 6 inches square and marked by the letter H. They were all connected by a system of triangulation made under the direction of the city harbor board by an employee of the United States Coast and Geodetic Survey. This work was assumed to be accurate. For convenience in describing the location of these points, their coordinates, latitude, and departure were calculated from the given azimuths and distances.

In a similar manner the coordinates of each point of deflection were calculated with reference to an adjacent stone and thence referred to the common origin, the center of the Fort McHenry flagstaff.

In my opinion, the lines as indicated fully protect the interests of navigation, and at the same time permit the construction of wharves large enough to accommodate modern vessels.

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[1] Not printed.

Attention is invited to two small piers near Point LVI, Sheet I, which extend beyond the pierhead line. These are merely rows of mooring piles and should eventually be removed. They do not, however, materially interfere with navigation, and the interests of the latter will be safeguarded if no repairs are allowed to be made on them.

Very respectfully, your obedient servant,

CHARLES W. KUTZ,
First Lieut., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., April 14, 1900.

Respectfully submitted to the Chief of Engineers, United States Army, and recommended for approval.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
April 21, 1900.

Respectfully submitted to the Secretary of War.

The subject of the establishment of harbor lines in Baltimore Harbor and Patapsco River has been under consideration by the local engineer officer, who has given it careful study, held a public hearing which was attended by representatives of the various commercial bodies interested, as well as of the municipal government of the city of Baltimore, and submits the within report, to which attention is respectfully invited.

It appears that harbor lines for this locality were from time to time fixed by the State and municipal authorities before the enactment of any Federal laws on the subject. While proving in the main satisfactory, it is considered desirable that the lines should be formally established under the Federal laws in order to have the force thereby given.

On the accompanying tracing (in 3 sheets) are delineated in red the lines recommended by the local engineer officer for adoption. These lines conform closely to those already established by the city, only slight changes therefrom being made, and are stated to be satisfactory to all parties and fully protective of the harbor. I recommend that the lines be established under the provisions of section 11 of the act of March 3, 1899, and that, if approved, the Secretary of War place his approval on each of the three sheets which have been prepared for his signature.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Third indorsement.]

WAR DEPARTMENT,
April 24, 1900.

Approved as recommended by the Chief of Engineers.

ELIHU ROOT,
Secretary of War.

Table of coordinates.

[Origin is the center of the Fort McHenry flagstaff.]

Reference stones.				Points of deflection in pierhead line.		
Name.	Latitude.	Departure	Remarks.	Name.	Latitude.	Departure.
Alley	6,038.86 N.	7,813.26 W.	Harbor stone	I	8,380.82 N.	9,062.18 W.
Anchor	7,498.04 N.	1,684.19 W.	do	II	8,110.11 N.	9,046.35 W.
Bixler	6,436.81 N.	7,827.60 W.	do	III	7,908.60 N.	8,833.64 W.
Block	6,272.27 N.	6,736.94 W.	do	IV	7,718.92 N.	8,458.90 W.
Bowly	8,170.22 N	9,006.73 W.	do	V	7,888.76 N.	7,671.81 W.
Boyce	4,162.57 N.	8,927.37 W.	do	VI	7,007.49 N.	7,281.81 W.
Broadway	6,766.56 N.	4,002.10 W.	do	VII	6,436.75 N.	6,613.58 W.
Cable	8.188.04 N.	8,500.91 W.	do	VIII	5,810.26 N.	5,810.35 W.
Cross	5,217.87 N.	7,783.56 W.	do	IX	5,597.79 N.	5,468.38 W.
Dock	3,334.64 N.	5,422.39 W.	do	X	5,518.36 N.	4,941.26 W.
Federal	6,217.09 N.	8,120.05 W.	do	XI	5,660.89 N.	4,475.02 W.
Fell	6,798.03 N.	3,252.33 W.	do	XII	6,159.62 N.	3,582.08 W.
Fenhagen	7,307.50 N.	2,246.72 W.	do	XIII	5,729.42 N.	2,483.28 W.
Foot	6,453.37 N.	7,527.86 W.	do	XIV	5,923.60 N.	2,188.22 W.
Hamilton	3,998.90 N.	3,550.27 W.	do	XV	6,992.80 N.	2,233.42 W.
Henry	6,415.39 N.	8,214.70 W.	do	XVI	6,982.14 N.	1,950.89 W.
Johnson	6,732.64 N.	8,591.76 W.	do	LI	8,368.43 N.	9,384.91 W.
Lawrence	3,228.00 N.	6,275.94 W.	do	LII	7,104.91 N.	9,273.22 W.
Lee	6,962.87 N.	9,471.81 W.	do	LIII	6,997.04 N.	8,650.64 W.
Mallory	6,811.88 N.	2,921.67 W.	do	LIV	6,776.11 N.	7,806.15 W.
McMurray	5,297.59 N.	7,174.42 W.	do	LV	6,502.04 N.	7,456.96 W.
Nicholson	3,718.40 N.	2,903.06 W.	do	LVI	6,161.09 N.	7,170.05 W.
Numsen	4,538.62 N.	7,347.70 W.	do	LVII	4,624.49 N.	6,471.45 W.
Philpot	6,019.36 N.	4,819.62 W.	do	LVIII	4,057.24 N.	5,194.44 W.
Point	6,277.72 N.	2,753.88 W.	do	LIX	4,707.57 N.	3,964.37 W.
Pratt	8,544.60 N.	9,654.03 W.	do	LX	4,798.94 N.	3,684.53 W.
Taylor	6,174.51 N.	5,600.22 W.	do	LXI	4,731.90 N.	3,240.27 W.
Thames	6,151.40 N.	4,704.02 W.	do	LXII	4,452.99 N.	2,550.37 W.
Tobacco	7,501.24 N.	7,764.18 W.	do			
Webster	3,926.25 N.	6,719.27 W.	do			
William	6,709.28 N.	9,072.95 W.	do			
Wolfe	7,434.45 N.	2,952.98 W.	do			
Zell	3,684.82 N.	6,182.91 W.	do			
Boston	5,144.40 N.	2,338.31 E.	do	XVII	5,885.89 N.	524.55 W.
Canton El. stone	2,260.47 N.	3,015.54 E.	do	XVIII	5,264.90 N.	553.37 W.
Canton Wharf	5,364.00 N.	217.77 W.	do	XIX	4,821.80 N.	41.97 W.
Chesapeake	5,595.55 N.	720.59 E.	do	XX	4,351.95 N.	1,922.43 E.
Cigar	4,914.22 N.	2,884.06 E.	do	XXI	77.86 N.	2,115.23 E.
Clinton	299.05 S.	3,143.58 E.	do	XXII	353.87 S.	2,173.29 E.
East Base	911.73 N.	1,469.04 W.	Crosses in curb.	XXIII	888.87 S.	2,320.29 E.
Flack	2,817.15 N.	2,987.68 E.	Harbor stone	XXIV	1,423.87 S.	3,003.29 E.
Fort	9.90 S.	81.01 E.	do	LXIII	2,518.46 N.	434.47 W.
Gas	4,591.28 N.	2,744.95 E.	do	LXIV	879.98 N.	387.33 E.
Harrison	6,319.89 N.	194.85 W.	do			
Lazaretto L. H.	184.51 S.	2,275.16 E.	do			
Mill Cupola	5,913.73 N.	170.99 E.	do			
Monument	12,500.00 N.	10,257.01 W.	Washington monument.			
Ninth Avenue stone.	866.13 N.	3,085.29 E.	Harbor stone			
Seawall	879.48 N.	385.33 E.	do			
Aller	260.48 N.	10,950.68 W.	do	XXI	77.86 N.	2,115.23 E.
Bank	3,942.92 N.	11,884.22 W.	do	XXII	353.87 S.	2,173.29 E.
Bight	2,088.20 S.	14,626.82 W.	do	XXIII	888.87 S.	2,320.29 E.
Cherry	2,626.33 S.	10,718.16 W.	do	XXIV	1,423.87 S.	3,003.29 E.
Club	2,208.74 S.	8,409.64 W.	do	XXV	2,528.75 S.	6,529.44 E.
Colgate	2,248.75 S.	10,704.44 E.	do	XXVI	3,438.75 S.	10,784.44 E.
Creek	2,014.45 S.	15,070.29 W.	do	XXVII	2,193.75 S.	11,904.44 E.
Cromwell	470.55 S.	9,962.61 W.	do	XXVIII	1,708.75 S.	12,624.44 E.
Dorsey	1,440.96 S.	8,997.64 W.	do	XXIX	4,246.45 S.	13,016.08 E.
Ferry	1,458.64 S.	9,273.96 W.	do	XXX	13,648.28 S.	16,717.67 E.
Fishing	11,610.35 S.	4,655.19 E.	do	LXV	698.62 S.	96.54 W.
Garrity	4,696.45 S.	14,981.08 E.	do	LXVI	709.97 S.	3,454.19 W.

Table of coordinates—Continued.

Reference stones.				Points of deflection in pierhead line.		
Name.	Latitude.	Departure.	Remarks.	Name.	Latitude.	Departure.
Glass	731.51 N.	13,781.78 W.	Harbor stone	LXVII	324.09 N.	5,820.76 W.
Gwynn	1,920.38 N.	14,692.18 W.	do	LXVIII	694.66 S.	7,220.79 W.
Harmon	1,908.11 N.	14,642.84 W.	do	LXIX	1,483.66 S.	7,220.79 W.
Horner	306.11 N.	7,267.98 W.	do	LXX	2,208.74 S.	7,622.64 W.
Kelsoe	866.38 S.	9,026.06 W.	do	LXXI	2,208.74 S.	8,409.64 W.
Leading	6,866.72 S.	8,373.39 E.	do	LXXII	2,016.06 S.	8,764.74 W.
Leadenhall	3,352.04 N.	11,070.15 W.	do	LXXIII	153.58 S.	11,887.20 W.
Lester	4,264.90 S.	9,562.31 W.	do	LXXIV	269.04 N.	12,004.10 W.
Locust	2,974.32 S.	10,209.16 W.	do	LXXV	3,679.92 N.	12,034.22 W.
McComas	1,206.33 N.	7,328.75 W.	do	LXXVI	3,679.92 N.	12,684.22 W.
Mitchell	3,215.19 N.	13,831.04 W.	do	LXXVII	446.81 N.	13,376.88 W.
Moale	556.68 N.	11,513.58 W.	do	LXXVIII	1,647.90 S.	14,409.62 W.
No. 1	6,146.26 S.	6,323.74 W.	do	LXXIX	2,619.09 S.	10,474.90 W.
Phœnix	1,597.34 N.	5,167.58 W.	do	LXXX	2,824.32 S.	10,109.16 W.
Pillar	440.03 N.	1,364.19 W.	Center of capstone.	LXXXI	4,264.90 S.	9,412.31 W.
Plum	4,479.64 N.	11,691.59 W.	Harbor stone	LXXXII	6,216.25 S.	8,183.74 W.
Randall	2,959.50 N.	11,050.25 W.	do	LXXXIII	4,586.25 S.	4,593.74 W.
Sand Hill	5,678.10 S.	1,158.94 W.	do	LXXXIV	4,508.10 S.	181.06 E.
Sollers Shore	11,458.28 S.	17,647.67 E.	do	LXXXV	5,028.10 S.	1,051.06 E.
Spring Garden	3,739.00 N.	13,468.79 W.	do	LXXXVI	6,819.96 S.	2,985.08 E.
Target	663.25 S.	286.34 W.	Cross on sea wall.	LXXXVII	10,720.85 S.	5,935.19 E.
Towson	926.90 N.	3,680.08 W.	Harbor stone	LXXXVIII	13,250.85 S.	5,355.19 E.
Tyson	7,659.96 S.	3,545.03 E.	do			
Walker	1,957.09 N.	5,965.76 W.	do			
Warner	3,794.51 N.	13,261.82 W.	do			
West Base	3,240.58 N.	6,637.50 W.	do			
Willow	2,669.09 S.	10,494.90 W.	do			
Winans	709.66 S.	7,250.79 W.	do			

K 6.

ESTABLISHMENT OF HARBOR LINES IN CURTIS BAY, BALTIMORE HARBOR, MARYLAND.

South Baltimore Harbor and Improvement Company,
Baltimore, November 9, 1899.

Dear Sir: The two companies owning the water front of the greater part of the property at Curtis Bay from Fishing Point to Stone House Cove, both sides of said cove to the bridge, thence along Curtis Bay and Curtis Creek, on the west side, to the Walnut Point Bridge, respectfully request of the Government that the pierhead lines in front of this property be established as early as practicable.

Very respectfully,

Saml. L. Frank,
President South Belt Harbor and Improvement Company and President Curtis Bay Company.

Lieut. Charles W. Kutz,
U. S. Engineer Office, City.

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., November 11, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

The two companies mentioned in this letter are the South Baltimore Harbor and Improvement Company and the Curtis Bay Company. There are also various other interests involved which would make it best to have a public hearing before establishing harbor lines.

In this connection reference is requested to your letter dated October 23, 1899, relating to the establishment of partial harbor lines in this vicinity.

I recommend that a public hearing be given.

CHARLES W. KUTZ,
First Lieut., Corps of Engineers.

(Through the Division Engineer.)

[Second indorsement.]

U. S. ENGINEER OFFICE,
Baltimore, Md., November 13, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

Curtis Bay is an excellent natural harbor, and, owing to the overcrowding in Baltimore Harbor, manufactures, commerce, and shipping are seeking an outlet in Curtis Bay and vicinity.

In my opinion, it is essential to the preservation and protection of the harbor at Curtis Bay and vicinity that harbor lines be established there.

The views of the district engineer are recommended for approval.

PETER C. HAINS,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

[Third indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
November 16, 1899.

Respectfully returned to Lieutenant Kutz, who is authorized to hold a public hearing, after due notice to all interested parties, for the consideration of this subject.

A full report accompanied by tracing, showing such lines as may be recommended for adoption, will be submitted.

By command of Brigadier-General Wilson:

A. MACKENZIE,
Lieut. Col., Corps of Engineers.

[Fourth indorsement.]

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., January 13, 1900.

Respectfully returned to the Chief of Engineers, United States Army, accompanied by a full report and tracing[1] showing lines recommended.

CHARLES W. KUTZ,
First Lieut., Corps of Engineers.

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[1] Not printed.

[Fifth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
January 19, 1900.

Respectfully submitted to the Secretary of War.

The South Baltimore Harbor and Improvement Company and the Curtis Bay Company request the establishment of harbor lines in Curtis Bay, Curtis Creek, Stonehouse Cove, and Cabin Branch, Patapsco River, Baltimore Harbor, Maryland.

The subject has been under consideration by Lieut. Charles W. Kutz, Corps of Engineers, whose report of the 13th instant is herewith, and he recommends that the lines D E F G, H I J K L, O P Q, R S T U V on the north shore, and W X Y Z A′ B′ C′ D′ E′ F′ on the south shore, shown on the accompanying map, be adopted as combined pierhead and bulkhead lines.

I concur in his views and recommend that the harbor lines, delineated in red on the map, be approved, and that the Secretary place his approval on this paper and on the map which has been prepared for his signature.

That portion of the line from L to N is the same as the line which was approved by the Secretary of War, October 16, 1899.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Sixth indorsement.]

WAR DEPARTMENT,
January 20, 1900.

Approved as recommended by the Chief of Engineers.

ELIHU ROOT,
Secretary of War.

REPORT OF FIRST LIEUT. CHARLES W. KUTZ, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Baltimore, Md., January 13, 1900.

GENERAL: In compliance with the directions contained in your third indorsement, I have the honor to submit the following report on the proposed establishment of harbor lines in Curtis Bay, Patapsco River, Maryland.

After giving written notice to all interested parties, the public hearing authorized in your indorsement was held in this office December 15, 1899. The owners of all the property abutting on Curtis Bay and its tributaries were present or represented, as well as others interested in navigation. After a full discussion of the matter, I suggested the broken pierhead lines shown on the accompanying tracing, D E F G, H I J K L, O P Q, R S T U V on the north shore, and W X Y Z A′ B′ C′ D′ E′ F′ on the south shore, and they were accepted as satisfactory by the riparian owners. These lines will also protect the interests of navigation.

The practice of building solid structures out to the pierhead line has been followed in Baltimore Harbor, and I see no objection to doing the same thing here, as the tidal rise and fall is only eighteen inches.

I therefore recommend that the pierhead and bulkhead lines at this locality be made coincident, and that the lines indicated above and on the tracing be established.

In the following table is given the latitude and departure of the termini and points of intersection of the lines laid down. These points are referred to rectangular coordinates passing through the northeast corner of the sugar refinery, which is the largest and most permanent building in the vicinity.

Point.	Latitude.	Departure.	Point.	Latitude.	Departure.
D	1,105 N.	4,260 E.	S	2,372 S.	131 W.
E	1,994 N.	2,900 E.	T	2,865 S.	50 E.
F	1,850 N.	921 E.	U	4,150 S.	570 W.
G	2,220 N.	125 E.	V	5,385 S.	725 W.
H	2,788 N.	155 W.	W	5,048 S.	150 E.
I	2,005 N.	68 W.	X	4,328 S.	250 E.
J	1,712 N.	494 W.	Y	4,425 S.	1,148 E.
K	1,438 N.	349 W.	Z	3,625 S.	2,038 E.
L	1,648 N.	86 E.	A′	898 S.	1,708 E.
M	835 N.	825 E.	B′	182 S.	2,065 E.
N	170 N.	970 E.	C′	288 S.	2,860 E.
O	65 N.	620 E.	D′	1,480 S.	3,390 E.
P	2,025 S.	558 E.	E′	2,129 S.	4,068 E.
Q	1,760 S.	648 W.	F′	1,709 S.	6,244 E.
R	2,228 S.	780 W.			

The delay in submitting this report was occasioned by finding an error in the office map, necessitating the running of some lines to accurately locate the shore lines defining Cabin Branch, an estuary of Curtis Bay.

Very respectfully, your obedient servant,

CHARLES W. KUTZ,
First Lieut., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

APPENDIX L.

IMPROVEMENT OF POTOMAC RIVER AND ITS TRIBUTARIES; OF JAMES RIVER AND OF HARBOR AT MILFORD HAVEN, VIRGINIA, AND OF CERTAIN RIVERS IN VIRGINIA, ON THE WESTERN SHORE OF CHESAPEAKE BAY; PROTECTION OF JAMESTOWN ISLAND, VIRGINIA.

REPORT OF LIEUT. COL. CHAS. J. ALLEN, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Potomac River at Washington, D. C.
2. Potomac River below Washington, D. C.
3. Occoquan Creek, Virginia.
4. Nomini Creek, Virginia.
5. Lower Machodoc Creek, Virginia.
6. Rappahannock River, Virginia.
7. Urbana Creek, Virginia.
8. Milford Haven, Va.
9. York River, Virginia.
10. Mattaponi River, Virginia.
11. Pamunkey River, Virginia.
12. James River, Virginia.
13. Protection of Jamestown Island, Virginia.
14. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATIONS AND SURVEYS.

15. Patuxent River, Maryland.
16. Breton Bay, Maryland.
17. Carters Creek, Virginia.
18. Jacksons Creek, Virginia.
19. James River at Richmond, Virginia.

HARBOR LINES.

20. James River at Richmond, Virginia.

United States Engineer Office,
Washington, D. C., July 20, 1900.

General: I have the honor to forward herewith my annual report for the fiscal year ended June 30, 1900, for river and harbor works in my charge. * * *

Very respectfully, your obedient servant,

Chas. J. Allen,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

L 1.

IMPROVEMENT OF POTOMAC RIVER AT WASHINGTON, DISTRICT OF COLUMBIA.

WORK OF THE FISCAL YEAR ENDED JUNE 30, 1900.

At the commencement of the fiscal year dredging operations were in progress in the Virginia Channel above Long Bridge, by A. M. Clegg, with a hydraulic dredge. The dredge was, however, in bad order, so that it accomplished but little work. In July, 1899, the dredge worked but 45¾ hours; in August 356 hours were lost in making repairs, and the actual running time for the month was but 146 hours.

The Comptroller of the Treasury having decided, under date of August 7, 1899, that no contract existed between the United States and Mr. Clegg, these operations ceased, and a new contract was entered into with Mr. Clegg on September 7, 1899, containing the express stipulation that not less than 50,000 cubic yards should be dredged in each month, excepting that that amount was not required for December to March. Mr. Clegg never succeeded in doing one-half that amount of work, and under date of April 7, 1900, he notified this office, by letter, that he had discontinued work under the contract, which was accordingly annulled May 9, 1900.

The work will be readvertised for contract early in the ensuing fiscal year.

The Potomac River was frozen over for about thirty-six days between December 27, 1899, and February 15, 1900, though the ice was not thick enough to stop steam navigation. Aside from this the weather was generally mild and favorable for work.

During the fiscal year the reservoir outlet gates were repaired; the fence around Potomac Park was rebuilt where it had been injured, and some new fence was constructed; a portion of the reclaimed area was cleared of brush for the deposit of dredged material, and an examination of the channels at Washington made.

Maintenance.—The improvement has reached a stage where the maintenance and preservation of the reservation require attention. The growth of weeds and underbrush which, in the summer season especially, renders access to the various parts of the work difficult, should be cleared up each year until the reservation is ready to be laid out and graded. Annual repairs will also be needed on the wall and the reservoir gates.

The proper police supervision of this extensive area of 621 acres has also become a matter of importance. In order to prevent infractions of the law, trespasses, etc., the reservation should be patrolled.

It is estimated that $3,000 will be required per annum for maintenance.

POTOMAC PARK.

Congress, by act of March 3, 1897, and in the following words, declared the reclaimed flats a public park:

> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the entire area formerly known as the Potomac Flats, and now being reclaimed, together with the tidal reservoirs, be, and the same are hereby, made and declared a public park, under the name of the Potomac Park, and to be forever held and used as a park for the recreation and pleasure of the people.

The land areas of the reclaimed flats amount to 621 acres; the areas of the tidal reservoirs aggregate 118 acres. These flats are capable of being transformed into one of the finest parks in the country.

The greater part of the park area is composed of a rich alluvial soil, dredged from the bed of the river, and upon which a luxuriant growth rapidly appears. The dredging operations will continue to afford material of the same character, so that there will be sufficient for planting spaces.

The principal items of expense in the park development, therefore, will be the construction of drives and walks and the drainage.

While it is necessary that the greater part of the area be, for the present, reserved for the deposit of material dredged from the river channels and tidal reservoirs in connection with the improvement of the Potomac River, and that sufficient space be temporarily reserved for construction purposes near the sites of the Memorial and Long bridges and of the inlet gates, and though it will probably be some years before the reclaimed land can be devoted exclusively to park purposes, still it appears desirable that those portions which are now susceptible of such treatment be made accessible to the public at an early day.

It is obviously desirable that complete and comprehensive plans be early adopted, as the greatest economy and artistic effect can be obtained by so conducting and timing the work of the river improvement as to give the best results in the park improvement. Thus, if the locations of driveways, lakes, inequalities of surface, etc., of the completed park be known in advance, the dredged material can be so deposited as to avoid rehandling; also, if the inlet gates for the regulation of the flow of water into the tidal reservoir be combined in one structure with the bridge for carrying the driveway across the same, a marked increase of economy and effect will result; and, further, the dredging of the river channels might be conducted in such order of precedence that a good stratum of rich alluvial soil should everywhere overlie sand and other undesirable surface material. Other similar economies and advantages of beginning the park improvement at an early day suggest themselves.

Plans for the development of the reclaimed flats into a park have been considered by this office ever since the inception, in 1881, of the project for their reclamation, and have been kept in view, when considering this and related subjects, since that time by the several officers of engineers who have had this work in charge. Especially has this been the case in the last few years when the Long and Memorial bridges have been under discussion. The plans shown upon the map accompanying this report give in outline the main features of roadways proposed, and have been prepared with the assistance of an able and experienced landscape and park engineer (see report for 1899). They would, however, be subject to some modification before beginning construction.

The idea has been to plan a rural park which should be as far as possible devoted to the pleasure and recreation of the people, and to this end the locations of driveways, walks, bridle paths, speedways, bridges, play grounds, lakes and islands, and fountains and vistas, etc., have been considered.

The matter of the ultimate grade of the park surface is one of vital importance and should be determined upon at the earliest possible day.

The report of 1898 presented the reasons for and an approximate estimate of cost of the desired modification.

The fact that a 24-foot navigation channel is being provided in the Lower Potomac, and that the intention of the original project (adopted in 1882) was that "such depths of channels * * * be provided as will accommodate the largest vessels that can reach Arsenal Point," will probably shortly necessitate a revision of the project and estimates with this in view. The excavation of additional material to provide for the needs of navigation will aid in raising the surface of the park above all danger of injury from known freshets.

An estimate of the cost of making a very important and considerable commencement of the park improvement along the above lines and at the proposed grade was submitted in the last annual report, to which attention is respectfully invited.

UNAUTHORIZED OCCUPATION OF POTOMAC PARK.

At the opening of the fiscal year there were at least eight parties occupying portions of Potomac Park without authority of law or permit.

The decision in the Potomac Flats case, rendered during the preceding fiscal year, virtually sustained the contentions of the United States as to title, and it became possible for the Government to proceed against unauthorized occupants of parts of the park.

The names of persons who were unauthorizedly occupying portions of Potomac Park were, by direction, furnished the United States attorney early in January, 1900, and as a result all have moved off excepting one or two, and it is expected that they will soon vacate.

Washington is in the collection district of Georgetown, D. C. The nearest light-house is at Jones Point, Virginia.

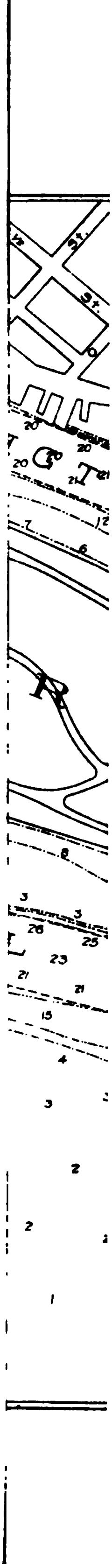
Money statement.

July 1, 1899, balance unexpended		$152,281.71
June 30, 1900, amount expended during fiscal year		22,385.53
July 1, 1900, balance unexpended		129,896.18
July 1, 1900, outstanding liabilities		221.00
July 1, 1900, balance available		129,675.18
Amount (estimated) required for completion of existing project		594,020.00
Amount that can be properly expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$300,000.00	
For maintenance of improvement	3,000.00	
		303,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations for the improvement.

August 2, 1882	$400,000	June 3, 1896	$100,000
July 5, 1884	500,000	March 3, 1899 (appropriated, $100,000; allotted Potomac River below Washington, $26,000)	74,000
August 5, 1886	375,000		
August 11, 1888	300,000		
September 19, 1890	260,000		
July 13, 1892	200,000		
August 18, 1894	150,000	Total	2,359,000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CONTRACT IN FORCE.

A. M. Clegg, for dredging 402,000 cubic yards, more or less, at 10⅝ cents per cubic yard. Date of contract, September 7, 1899; approved September 18, 1899. Date for commencement, September 11, 1899; date for completion, September 1, 1900. Not less than 50,000 cubic yards to be dredged in each month, excepting that that amount will not be required December–March. This contract was annulled May 9, 1900.

COMMERCIAL STATISTICS.

[Furnished by Mr. J. W. Averill, Washington, D. C.]

Receipts and shipments.

Calendar year—	Coal.	Ice.	Lumber.	Sand.	Wood.	Miscellaneous.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
1887	264,947	120,237	37,044	50,000	52,419	94,825	618,972
1888	240,836	108,421	45,101	50,000	33,040	104,177	581,575
1889	92,511	115,506	41,407	75,000	35,351	128,905	488,680
1890	72,089	185,552	69,604	75,000	48,457	118,994	519,696
1891	114,913	123,107	50,106	60,000	48,457	154,636	551,219
1892	280,342	148,692	68,178	20,000	48,457	261,285	766,954
1893	333,837	143,837	83,167	18,000	48,457	76,135	658,433
1894	306,748	138,094	36,935	41,850	58,203	62,768	644,588
1895	291,268	135,158	51,327	39,284	49,930	127,483	693,450
1896	334,298	131,542	44,696	32,400	50,842	129,884	723,657
1897	260,328	106,406	38,694	25,500	29,250	133,506	598,684
1898	259,517	132 510	40,628	23,400	34,500	154,704	645,239
1899	248,125	125,928	65,916	25,000	33,750	130,023	628,742

In addition to the foregoing it is estimated that 86,807 tons of miscellaneous freight was received and shipped by the Norfolk, Baltimore, Philadelphia, and river steamers during the year; and the amount of sand and stone reported includes that brought from and shipped to points below Alexandria only, and not what was handled around the city.

These estimates were obtained from the agents of the different lines.

Number of vessels of various classes arriving and departing.

Calendar year—	Steamers drawing from 5 to 15 feet, 100 to 600 tons.	Vessels drawing from 10 to 21 feet, 300 to 2,600 tons.	Vessels drawing from 4 to 10 feet, 30 to 400 tons.	Barges drawing from 5 to 12 feet, 100 to 700 tons.
1887	970	573	2,149	993
1888	710	525	1,588	2,821
1889	675	455	1,563	929
1890	696	491	1,572	286
1891	980	445	1,854	862
1892	1,065	466	2,046	527
1893	906	431	2,301	450
1894	1,118	455	2,388	323
1895	1,060	442	2,056	290
1896	955	527	2,367	325
1897	939	470	2,165	330
1898	1,218	391	1,975	366
1899	1,220	372	1,867	486

Ferry and local passenger steamers, tugs, canal boats, or scows are not included in the above.

No new lines of transportation were established during the year, but there was an increase of tonnage over 1898 of about 11 per cent, or 70,000 tons.

L 2.

IMPROVEMENT OF POTOMAC RIVER BELOW WASHINGTON, DISTRICT OF COLUMBIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

The examination (reconnaissance) of the several bars begun June 28, 1899, was completed July 10, 1899, and no material change in the conditions appeared to have occurred since the surveys of the same in 1891.

Under date of September 1, 1899, proposals were invited by public advertisement for dredging in Potomac River below the city of Washington, D. C., the work to be done under a continuing contract. Proposals were opened October 2, 1899, and an abstract of proposals received is appended to this report. The lowest bidder was Rittenhouse Moore, of Mobile, Ala., with whom a contract was entered into November 1 and approved November 14, 1899. Date for commencement December 15, 1899; dredging operations to be continued as long as funds are available and appropriations may be made for the work; not less than 50,000 cubic yards to be dredged each month; work may be suspended during December, January, February, and March.

Dredging was begun at the lower end of Mattawoman Shoal March 26, 1900, and has progressed satisfactorily since that date, although delayed somewhat by winds, by firing at the naval proving grounds at Indian Head, repairs to old and installation of new machinery, and the finding of unexpected beds of hard material. The loss of time due to the firing tests at Indian Head amounted to twenty hours and twenty-five minutes by the end of the fiscal year, as reported by the inspector on the work.

During the progress of dredging operations at Mattawoman Shoal considerable quantities of what is supposed to be partly disintegrated ledge rock were encountered in the channel to be dredged. This was altogether unexpected, as the report of 1891 showed that six borings were taken at various places, within and on each side of the present channel lines, and from them the following statement was made in that report, viz: "The bottom for about 2 miles at the upper end of the bar was found to be soft mud, and for about 1 mile at the lower end it was found to be mud mixed with sand, with gravel below the surface at some points." It appears from recent investigations that the ledges above referred to run diagonally across the channel at two localities, and are covered by softer material. Probably owing to the small proportion of the area which they occupy the original borings, in 1891, missed them. Owing to the conditions in which it exists it would be expensive and difficult to determine in advance of excavation or of excavation of overlying material the precise amount of the hard material, which is, however, roughly estimated as 60,000 cubic yards. Ledge rock is not required to be removed under the terms of the present contract. Dredging was in progress at the close of the fiscal year, 221,647 cubic yards having been removed from Mattawoman Shoal, which resulted in a channel 24 feet deep and 200 feet wide for a length of about 4,000 feet, and of the same depth and 160 feet wide for about 2,500 feet additional. This is the shoalest of the obstructions to navigation below the city of Washington, and as the dredge has not as yet traversed the length of the shoal the maximum draft that could be carried over Mattawoman Shoal on June 30, 1900, was 19½ feet at mean low water.

The original estimate for the improvement below the city of Washington, as given in the project of 1891, was $158,400. Deducting the allotment of $26,000 made from the appropriation of $100,000 by the act of March 3, 1899, toward commencing and carrying on the continuing contract authorized by that act, there remained $132,000 to be appropriated for payment of work under contract. The approximate amount of the contract dated November 1, 1899, was, however, $69,110. Taking into consideration the $26,000 allotted, and reserving from it a reasonable amount for contingencies of engineering and inspection, it appeared, when the estimate of January 16 of the cost of completing the work was rendered by this office, in response to the requirements of a letter of January 11, 1900, from the Chief of Engineers (33739), that the sum of $48,990 only would have to be appropriated for carrying on the continuing contract.

The sundry civil act approved June 6, 1900, appropriated as follows:

> Improving Potomac River: For completing improvement below the city of Washington, fifty-two thousand dollars.

In a letter dated May 4, 1900, to the Chief of Engineers, I reported the unexpected finding, through dredging operations, of large quantities of disintegrated ledge rock in the channel to be made at Mattawoman Shoal, rock not encountered when the survey of 1891 was made. An estimate (only offered as an approximation, the best that can be done at present) placed the amount of ledge rock at Mattawoman Shoal at 60,000 cubic yards. It was considered that that quantity might be dredged at a rate of 50 cents per cubic yard in excess of the present contract price for the specified material, or about $30,000 in all above the estimate of January 16 last. We do not as yet know what quantity of ledge rock or large bowlders may develop at the other shoals, the aggregate amount of dredging on which is nearly that at Mattawoman.

If the same amount of ledge rock should be encountered at these shoals as at Mattawoman, the estimate of January 16 would be increased by about $60,000.

The estimate of 1891 for this improvement was, as already stated, $158,400. Subtracting from this estimate the sum of $78,000, and which is obtained by adding the amount, $26,000, allotted from the appropriation of March 3, 1899, to the $52,000 appropriated by the sundry civil act of June 6, 1900, for completing the work, there remains the sum of $80,400, which may, for the cases here presented, be regarded as the sum remaining to be appropriated in order to complete the work, though it is hoped that all of that amount may not be needed for work under this project.

It is on the side of safety to present that sum as the amount that should be available for completion of the work.

For commercial statistics please see the report on Improving Potomac River at Washington.

Money statement.

July 1, 1899, balance unexpended		$26,000.00
Amount appropriated by sundry civil act approved June 6, 1900		52,000.00
		78,000.00
June 30, 1900, amount expended during fiscal year		11,858.72
July 1, 1900, balance unexpended		66,141.28
July 1, 1900, outstanding liabilities	$112.00	
July 1, 1900, amount covered by uncompleted contracts	57,983.00	
		58,095.00
July 1, 1900, balance available		8,046.28
Amount (estimated) required for completion of existing project		80,400.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		80,400.00

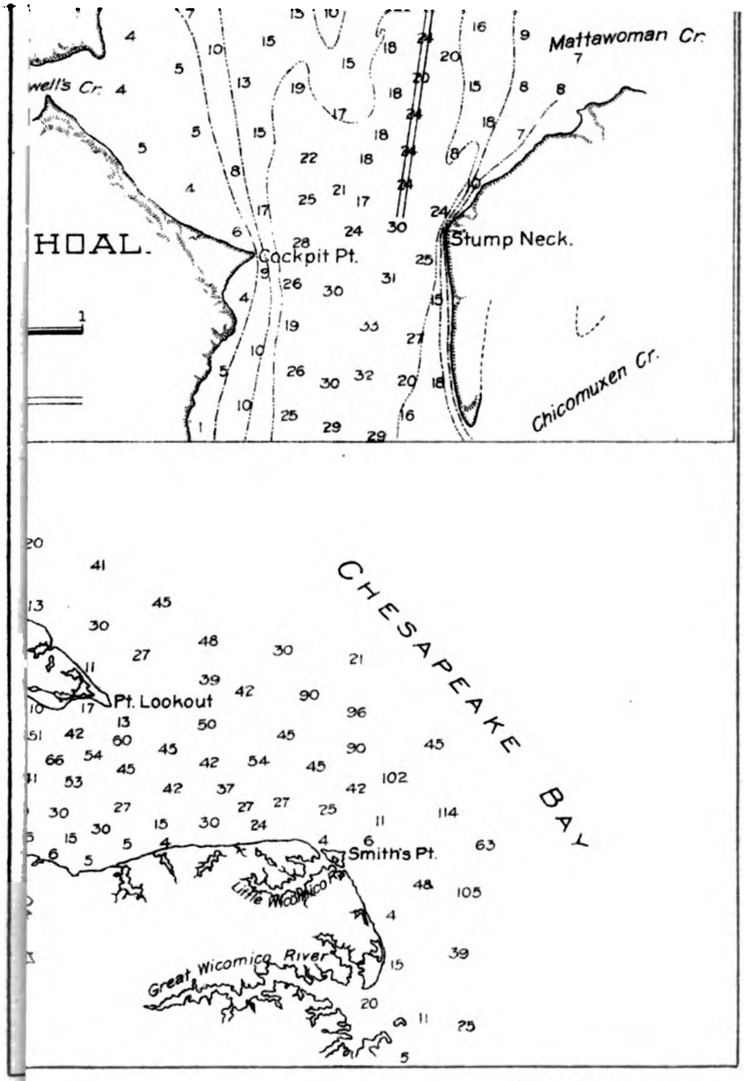
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Abstract of proposals for dredging in Lower Potomac River received in response to advertisement dated September 1, 1899, and opened October 2, 1899, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence within thirty days after notice of approval of contract. Not less than 50,000 cubic yards to be dredged each month, excepting December to March.]

No.	Name and address of bidder.	Mattawoman Shoals, 570,000 cubic yards.		Smith Point Upper Shoals, 122,000 cubic yards.		Smith Point Lower Shoals, 78,000 cubic yards.	
		Per cubic yard.	Amount.	Per cubic yard.	Amount.	Per cubic yard.	Amount.
1	Rittenhouse Moore, Mobile, Ala.	$0.072	$41,040.00	$0.072	$8,784.00	$0.072	$5,616.00
2	Sanford & Brooks Co., Baltimore, Md	.0773	44,061.00	.0773	9,430.60	.0773	6,029.40
3	Baltimore Dredging Co., Baltimore, Md	.07⅞	44,887.50	.07⅞	9,607.50	.07⅞	6,142.50
4	Virginia Dredging Co., Richmond, Va	.07¾	44,175.00	.07¾	9,455.00	.09	7,020.00
5	Samuel F. Randolph, New York, N. Y	.0795	45,315.00	.0795	9,699.00	.0795	6,201.00
6	Morris & Cumings Dredging Co., New York, N. Y	.10¾	61,275.00	.08	9,760.00	.08	6,240.00
7	P. Sanford Ross, Incorporated, Jersey City, N. J	.102	58,140.00	.102	12,444.00	.102	7,956.00
8	American Dredging Co., Philadelphia, Pa	.11	62,700.00	.11	13,420.00	.11	8,580.00
9	Christie, Lowe & Heyworth, Chicago, Ill	.16¾	95,475.00	.16¾	20,435.00	.16¾	13,065.00

No.	Name and address of bidder.	Maryland Point Shoal, 185,000 cubic yards.		Kettlebottom Shoal, 5,000 cubic yards.		Total.
		Per cubic yard.	Amount.	Per cubic yard.	Amount.	
1	Rittenhouse Moore, Mobile, Ala.	$0.072	$13,320.00	$0.07	$350.00	$69,110.00
2	Sanford & Brooks Co., Baltimore, Md	.0773	14,300.50	.30	1,500.00	75,821.50
3	Baltimore Dredging Co., Baltimore, Md	.07⅞	14,568.75	.07⅞	393.75	75,600.00
4	Virginia Dredging Co., Richmond, Va	.08	14,800.00	.15	750.00	76,200.00
5	Samuel F. Randolph, New York, N. Y	.0795	14,707.50	.0795	397.50	76,320.00
6	Morris & Cumings Dredging Co., New York, N. Y	.08	14,800.00	.15	750.00	92,825.00
7	P. Sanford Ross, Incorporated, Jersey City, N. J	.102	18,870.00	.102	510.00	97,920.00
8	American Dredging Co., Philadelphia, Pa	.11	20,350.00	.11	550.00	105,600.00
9	Christie, Lowe & Heyworth, Chicago, Ill	.16¾	30,987.50	.16¾	837.50	160,800.00


Mattawoman Cr.
well's Cr.
HOAL.
Cockpit Pt.
Stump Neck.
Chicomuxen Cr.
CHESAPEAKE BAY
Pt. Lookout
Smith's Pt.
Little Wicomico R.
Great Wicomico River

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CONTRACT IN FORCE.

Rittenhouse Moore, for dredging at Mattawoman Shoal, at 7.2 cents per cubic yard; at Smiths Point Shoals, at 7.2 cents per cubic yard; at Maryland Point Shoal, at 7.2 cents per cubic yard, and at Kettlebottom Shoal, at 7 cents per cubic yard; total estimated amount of dredging required 960,000 cubic yards, more or less. Date of contract, November 1, 1899; approved, November 14, 1899. Date for commencement, December 14, 1899. Dredging operations to be continued so long as funds are available and appropriations may be made for the work, not less than 50,000 cubic yards to be dredged in each month.

L 3.

IMPROVEMENT OF OCCOQUAN CREEK, VIRGINIA.

The present project for improvement, adopted December 5, 1890, and following an appropriation of $10,000, made September 19, 1890, provides for dredging to afford depths of 6 feet and widths of 100 feet, and dike work at bars as follows:

Lower Mud.—A channel 6 feet deep to be dredged, the "upper section" for about 2,500 feet below Taylors Point to be 100 feet wide, the material to be deposited on the west side of the channel, and the remainder of the channel, or "lower section," to be 150 feet wide.

Upper Mud.—A channel to be dredged, the material to be deposited on the east side of the channel, and the embankment so formed connected with the left bank by a dike.

Sand Bar.—A channel to be dredged and sheet-pile dikes constructed to maintain the dredged channel.

Occoquan Bar.—A channel to be dredged and a dike to be constructed to maintain the depth.

The estimated cost of this (the present approved project) is $45,000.

The last appropriation for this work consisted of $2,500, made by act of March 3, 1899.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

Proposals for dredging at Occoquan, Nomini, and Lower Machodoc creeks, Virginia, were opened July 28, 1899. An abstract of the proposals received is appended to this report. The contract was awarded to the lowest bidder, John L. Mills, of Camden, N. J., and was entered into August 15, and approved August 26, 1899.

As the work at Nomini Creek, Virginia, was the most exposed of the three works covered by the contract, the dredging at that locality was commenced first (on September 23, 1899), and upon completion was followed by that at the contiguous work of Lower Machodoc Creek, Virginia. Dredging operations at Occoquan Creek were then begun at the Lower Mud Bar November 1 and continued without interruption until November 27, 1899, when the limit of dredging which was practicable with the available funds was reached.

The work consisted entirely of redredging shoal portions of the channel through this bar. The material was found to be soft mud, which was removed in scows and deposited on a dumping ground on the north shore of Occoquan Bay, near High Point. A clear width of 100 feet of channel 6 feet deep was secured by the redredging operations.

The amount of dredging done at Occoquan Creek under this contract was 10,035 cubic yards.

Occoquan Creek is in the collection district of Alexandria, which is also the nearest port of entry. The nearest light-house is at Fort Washington, Md.

Money statement.

July 1, 1899, balance unexpended	$2,442.05
June 30, 1900, amount expended during fiscal year	2,037.91
July 1, 1900, balance unexpended	404.14
Amount (estimated) required for completion of existing project	20,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	4,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations.

The following appropriations have been made for the new project:

September 19, 1890	$10,000
July 13, 1892	5,000
August 18, 1894	5,000
June 3, 1896	2,500
March 3, 1899	2,500
Total	25,000

Abstract of proposals for dredging in Occoquan, Nomini, and Lower Machodoc creeks, Virginia, received in response to advertisement dated June 28, 1899, and opened July 28, 1899, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence on or before September 1, 1899; complete on or before December 15, 1899.]

No.	Name and address of bidder.	Occoquan Creek, Virginia, 10,000 cubic yards.		Nomini Creek, Virginia, 3,500 cubic yards.		Lower Machodoc Creek, Virginia, 5,000 cubic yards.		Total.
		Per cubic yard.	Amount.	Per cubic yard.	Amount.	Per cubic yard.	Amount.	
1	John L. Mills, Camden, N. J	$0.16¾	$1,675.00	$0.16¾	$586.25	$0.16¾	$837.50	$3,098.75
2	John Miller, Washington, D. C	.17⅘	1,780.00	.17⅘	623.00	.17⅘	890.00	3,293.00
3	Jackson & Clegg, Washington, D. C	.21	2,100.00	.23½	822.50	.24½	1,225.00	4,147.50
4	Baltimore Dredging Co., Baltimore, Md	.25	2,500.00	.30	1,050.00	.30	1,500.00	5,050.00

CONTRACT IN FORCE.

John L. Mills, for dredging 10,000 cubic yards, more or less, at 16¾ cents per cubic yard. Date of contract August 15, 1899; approved August 26, 1899; date for commencement, on or before September 1, 1899; date of completion (including dredging at Nomini and Lower Machodoc creeks, Virginia, under the same contract), on or before December 15, 1899.

COMMERCIAL STATISTICS.

[Furnished by Messrs. L. Ledman and Tyson Janney, Occoquan, Va.]

Receipts and shipments by water.

Articles.	1891.	1892.	1894.	1895.	1896.	1897.	1898.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Coal	100	100	100	100	100	150	100
Fertilizers	....	....	....	200	....	....	....
Flour and grain	60	550	900	1,400	1,200	900	500
Lumber	600	800	320	200	300	210	500
Piles	....	....	1,000	100	2,150	....	600
Railroad ties	3,600	3,000	3,600	2,500	7,000	4,000	3,000
Sand	....	48,000	....	5,000	23,400	5,000	11,200
Wood	3,500	3,600	2,400	750	7,120	2,400	2,240
Miscellaneous	345	655	580	225	400	3,175	1,725
Rock	....	....	....	....	....	....	10,000
Total	8,205	56,705	8,900	10,475	41,670	15,835	29,865

Arrival and departure of vessels.

Class.	Number.	Tonnage,
Steamers drawing less than 10 feet	320	12,800
Sail vessels drawing less than 10 feet	150	4,500
Barges, flatboats, etc	800	100,000

Repeated efforts were made to obtain commercial statistics for 1899, but they could not be procured.

No new lines of transportation were established in 1899. It is reported that the work done has lessened the cost of shipping, since vessels can now load more heavily at the wharves, whereas formerly part of the cargo had to be taken out to them in lighter-draft boats.

L 4.

IMPROVEMENT OF NOMINI CREEK, VIRGINIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

Proposals for dredging in Nomini Creek, Virginia, under the same contract with dredging at Occoquan and Lower Machodoc creeks, Virginia, were opened July 28, 1899. An abstract of the bids received will be found appended to the report for Occoquan Creek. The contract was awarded to the lowest bidder, John L. Mills, of Camden, N. J., at 16¾ cents per cubic yard, measured in scows.

Dredging operations were commenced in the channel outside White Point on September 23, 1899. The dredge was in good order and the work, which consisted entirely of redredging, proceeded rapidly. For a width of 140 feet measured from the west side of the channel all shoals found were redredged throughout the entire length of the channel. The channel is now 9 feet deep and 150 feet wide throughout its length except for a short distance near White Point where the 9-foot channel is about 140 feet wide. Dredging operations were completed as far as the funds allotted to this purpose would permit, October 4, 1899. The total amount of dredging was 1,432 cubic yards.

Proposals for raising the east jetty at Nomini Creek were opened August 2, 1899. The only bid received was rejected, the prices being considered excessive. A project for doing the work by hired labor and use of the United States plant was submitted and approved.

Proposals for furnishing the materials required for the work were opened May 14, 1900. Abstracts of the proposals received are appended to this report. The contract for furnishing riprap stone was awarded to the lowest bidder, James McCuen, of Alexandria, Va., at $2.10 per cubic yard, delivered alongside the jetty. The contract for furnishing oyster shells was awarded to the lowest bidder, Jerry Valliant, of Oxford, Md., at 94 cents per cubic yard, delivered as above. The deliveries of material under these contracts were 411.3 cubic yards of oyster shells and 130.8 cubic yards of stone.

The Government plant was thoroughly overhauled and placed in good condition and taken to Nomini Creek, where it arrived June 5, 1900. Work was at once begun and it was in progress at the end of the fiscal year, 130 linear feet of dike having been raised.

BENEFIT TO COMMERCE AND NAVIGATION.

An idea of the value of the improvement can be obtained by inspecting the table of commercial statistics given below.

The sum of $12,000 can be profitably expended during the fiscal year ending June 30, 1902, in dredging and jetty construction.

The work is in the collection district of Tappahannock, which is the nearest port of entry. The nearest light-house is that at Blackistone Island.

Money statement.

July 1, 1899, balance unexpended		$10,018.42
June 30, 1900, amount unexpended during fiscal year		2,055.29
July 1, 1900, balance unexpended		7,963.13
July 1, 1900, outstanding liabilities	$556.00	
July 1, 1900, amount covered by uncompleted contracts	2,005.00	
		2,561.00
July 1, 1900, balance available		5,402.13
Amount (estimated) required for completion of existing project		35,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		12,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

Appropriations.

The following appropriations have been made:

May 3, 1873	$10,000	September 19, 1890	$5,000
June 23, 1874	6,000	July 13, 1892	10,000
March 3, 1875	5,000	August 18, 1894	5,000
March 5, 1879	2,500	June 3, 1896	2,500
June 14, 1880	5,000	March 3, 1899	10,000
March 3, 1881	2,000		
August 2, 1882	2,000	Total	70,000
August 11, 1888	5,000		

Abstract of proposal for constructing jetty at Nomini Creek, Virginia, received in response to advertisement dated July 3, 1899, and opened August 2, 1899, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence on or before September 1, 1899; complete on or before November 30, 1899.]

Estimated quantities.	Charles G. Smith, jr., Washington, D. C.	
	Per cubic yard.	Amount.
Removing and relaying quarry stone (720 cubic yards)	$8.30	$5,976.00
Furnishing and laying new quarry stone (370 cubic yards)	8.30	3,071.00
Oyster shells to be furnished and put in place (1,250 cubic yards)	3.00	3,750.00
Excavation (200 cubic yards)	.60	120.00
Total		12,917.00

Abstract of proposals for furnishing oyster shells for jetty at Nomini Creek, Virginia, received in response to advertisement dated April 14, 1900, and opened May 14, 1900, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence on or before June 18, 1900; complete as required by engineer officer—100 to 300 cubic yards per week.]

No.	Name and address of bidder.	Price per cubic yard.	Amount (1,200 cubic yards).
1	Jerry Valliant, Oxford, Md	$0.94	$1,128.00
2	John H. Phillips, Cambridge, Md	1.00	1,200.00

Abstract of proposals for furnishing quarry stone for jetty at Nomini Creek, Virginia, received in response to advertisement dated April 14, 1900, and opened May 14, 1900, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence on or before June 15, 1900; complete as required by engineer officer—50 to 150 cubic yards per week.]

No.	Name and address of bidder.	Price per cubic yard.	Amount (370 cubic yards).
1	James McCuen, Alexandria, Va	$2.10	$777.00
2	Charles G. Smith & Son, Washington, D. C	4.98	1,842.60

CONTRACTS IN FORCE.

John L. Mills, for dredging 3,500 cubic yards, more or less, at 16¾ cents per cubic yard. Date of contract, August 15, 1899; approved, August 26, 1899; date for commencement, on or before September 1, 1899; date for completion (including dredging at Occoquan and Lower Machodoc creeks, Virginia, under the same contract), on or before December 15, 1899.

Jerry Valliant, for furnishing and delivering 1,200 cubic yards, more or less, of oyster shells, at the rate of 94 cents per cubic yard. Date of contract, May 29, 1900; approved, June 7, 1900; date for commencement, June 18, 1900; date for completion—delivery of from 100 to 300 cubic yards of oyster shells, regularly, per week, according to instructions from the engineer officer in charge.

James McCuen, for furnishing and delivering 370 cubic yards, more or less, of quarry stone, at the rate of $2.10 per cubic yard. Date of contract, May 28, 1900; approved, June 4, 1900; date for commencement, June 15, 1900; date for completion—delivery of from 50 to 150 cubic yards of stone, regularly, per week, according to instructions from the engineer officer in charge.

COMMERCIAL STATISTICS.

Receipts and shipments by water.

[Furnished by Mr. F. E. Tubman, Mount Holly, Va.]

Articles.	1892.	1893.	1894.	1895.	1896.	1897.	1898.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Coal	10	8	10	8	10	5	10
Farm produce	100	150	100	150	125	150	3,000
Grain	400	500	4,500	4,000	3,500	3,000	3,000
Lumber	500	400	6,000	5,000	400	100	300
Oysters	5,000	4,000	3,500	3,000	500	500	400
Railroad ties	5,000	4,500	3,000	3,000	2,000	2,500	2,000
General merchandise	10,000			90	90	115	100
Wood		8,000	1,000		800	1,000	800
Ice							30

Repeated efforts were made to obtain commercial statistics for 1899, but they could not be procured.

L 5.

IMPROVEMENT OF LOWER MACHODOC CREEK, VIRGINIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

Proposals for dredging to be done under the appropriation of $1,500 made by the act of March 3, 1899, were opened July 28, 1899, the dredging for this work and for Nomini and Occoquan creeks, Virginia, to be done under one contract. An abstract of the bids received will be found appended to the report on Occoquan Creek. Dredging operations under contract with John L. Mills, of Camden, N. J., began at Narrows Bar October 9, 1899, and consisted in widening the 9-foot channel on the east and west sides. The dredging was continued without interruption until the 24th of the same month, when the limit of dredging which was practicable under the appropriation was reached and operations were suspended. The 9-foot channel was widened to the full width of 150 feet for a length of about 1,150 feet. The amount of dredging under the contract was 6,240 cubic yards.

The sum of $2,100 can be profitably expended during the fiscal year ending June 30, 1902, in continuance of dredging.

The work is in the collection district of Tappahannock, which is the nearest port of entry. The nearest light-house is at Blackistone Island.

Money statement.

July 1, 1899, balance unexpended	$1,526.87
June 30, 1900, amount expended during fiscal year	1,304.74
July 1, 1900, balance unexpended	222.13
Amount (estimated) required for completion of existing project	2,100.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	2,100.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations.

The following appropriations have been made:

July 13, 1892	$3,000
August 18, 1894	3,000
June 3, 1896	1,500
March 3, 1899	1,500
Total	9,000

CONTRACT IN FORCE.

John L. Mills, for dredging 5,000 cubic yards, more or less, at 16¾ cents per cubic yard. Date of contract, August 15, 1899; approved August 26, 1899; date for commencement, on or before September 1, 1899; date for completion (including dredging at Occoquan and Nomini creeks, Virginia, under the same contracts), on or before December 15, 1899.

COMMERCIAL STATISTICS.

Repeated efforts have been made to obtain commercial statistics pertaining to this work, but without success.

L 6.

IMPROVEMENT OF RAPPAHANNOCK RIVER, VIRGINIA.

WORK OF THE FISCAL YEAR ENDED JUNE 30, 1900.

The construction of dike at Fredericksburg Bar by hired labor and the use of the United States plant (combined snag boat and pile driver) which was commenced June 24, 1899, was completed October 2 of the same year. In all, 418 linear feet of dike were constructed, completing Dike H.

Under date of August 17, 1899, proposals were invited by public advertisement for dredging in the Rappahannock River at Pollocks and Fredericksburg bars, the work to be done under the same contract with the dredging proposed at Urbana Creek, Virginia. Two proposals were received and opened September 16, 1899, and an abstract of the same is appended to this report. The lower bidder made his proposal conditionally upon the time of commencement being changed from October 15, 1899, to January 1, 1900, and was further considered to be a failing contractor. The contract was therefore awarded to John Miller, of Washington, D. C., for dredging at both localities. The work at Urbana Creek was undertaken first and completed February 13, 1900.

For various reasons, mainly on account of unfavorable weather and inability to obtain coal, the beginning of operations on the Rappahannock River was delayed. The time for completion of the contract was first extended from April 30 to June 30, 1900, and subsequently to August 30 of the same year. Work was begun at Pollocks Bar June 9, 1900, and was in progress at the close of the fiscal year. There were dredged 4,435.6 cubic yards, affording a channel 50 feet wide and 10 feet deep through this bar. The material was deposited behind Dikes G and H at Fredericksburg Bar.

There has been considerable decay of old dikes which were built from 1878 to 1887 to heights of about 6 feet above low tide, particularly in the one immediately below the steamboat wharf at Fredericksburg and the one between the lower end of the Fredericksburg wharves and Hazel Run. It is expected that these dikes will receive repairs during the ensuing fiscal year. The necessity for an annual appropriation of $7,500 to remove deposits of sand formed after freshets in the river at and immediately below Fredericksburg has been noted in the annual reports for a number of years past.

The work is in the collection district of Tappahannock, which is the nearest port of entry. The nearest light-house is that at Blackistone Island.

Money statement.

July 1, 1899, balance unexpended		$16,147.50
June 30, 1900, amount expended during fiscal year		3,187.24
July 1, 1900, balance unexpended		12,960.26
July 1, 1900, outstanding liabilities	$250.00	
July 1, 1900, amount covered by uncompleted contracts	5,670.00	
		5,920.00
July 1, 1900, balance available		7,040.26
Amount (estimated) required for completion of existing project		114,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$15,000.00	
For maintenance of improvement	10,000.00	
		25,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

Appropriations.

The following appropriations have been made:

March 3, 1871	$15,000	July 5, 1884	$20,000
June 10, 1872	15,000	August 5, 1886	20,000
March 3, 1873	15,000	August 11, 1888 ($15,000, of which $3,000 was for Urbana)	12,000
June 23, 1874	7,000	September 19, 1890	15,000
March 3, 1875	5,000	July 13, 1892	20,000
August 14, 1876	10,000	August 18, 1894	10,000
August 18, 1878	13,500	June 3, 1896	8,000
March 3, 1879	10,000	March 3, 1899	15,000
June 14, 1880	25,000		
March 3, 1881	15,000		
August 2, 1882	17,000	Total	267,500

Abstract of proposals for dredging in Rappahannock River and Urbana Creek, Virginia, received in response to advertisement dated August 17, 1899, and opened September 16, 1899, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence December 1, 1899; complete April 30, 1900.]

No.	Name and address of bidder.	Rappahannock River.		Urbana Creek.		Total.
		Per cubic yard.	Amount.	Per cubic yard.	Amount.	
1	A. M. Clegg, Washington, D. C	$0.26¾	$5,617.50	$0.15¾	$1,575	$7,192.50
2	John Miller, Washington, D. C	.27	5,670.00	.19	1,900	7,570.00

CONTRACT IN FORCE.

John Miller, for dredging 21,000 cubic yards, more or less, at 27 cents per cubic yard. Date of contract, October 26, 1899; approved November 4, 1899. Date for commencement, December 1, 1899; date for completion (including dredging in Urbana Creek, Virginia, under the same contract), April 30, 1900—extended to August 30, 1900.

COMMERCIAL STATISTICS.

Tonnage for—	Tons.	Tonnage for—	Tons.
1888	83,600	1895	[1] 151,466
1890	83,830	1896	[1] 161,196
1892	[1] 126,333	1897	[1] 158,108
1893	[1] 141,750	1898	[1] 166,586
1894	[1] 144,070	1899	[1] 167,862

Arrivals and departures of vessels, 1899.

Steam vessels drawing—	
10 feet or more	590
Less than 10 feet	196
Sailing vessels drawing—	
10 feet or more	1,024
Less than 10 feet	308
Barges, flatboats, etc	480

The principal articles of commerce are grain, oysters, fertilizers, cattle, farm produce, and general merchandise.

No new lines of transportation were established in 1898. It is reported that the work done on this improvement has greatly reduced freight rates, both by rail and water.

L 7.

IMPROVEMENT OF URBANA CREEK, VIRGINIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

Proposals for dredging to be done under the appropriation of $3,000 made by the act of March 3, 1900, were invited August 17 and opened September 16, 1899, the work to be done under the same contract as that for the dredging at Pollocks Bar and Fredericksburg Bar, Rappahannock River, Virginia. An abstract of the bids received will be found appended to the report for Rappahannock River. For the reasons stated in the report on Rappahannock River, the contract was awarded to John Miller, of Washington, D. C.

Dredging operations under the contract began at Urbana December 13, 1899, and proceeded slowly until February 13, 1900, when the work called for by the contract was completed. The delays were caused by bad weather and repairs to the dredging plant. The work consisted in dredging a channel 10 feet deep and about 135 feet wide through the bar inside the creek, and also a small turning basin 10 feet deep at the steamboat wharf. The amount of dredging under the contract was about 9,990 cubic yards.

A project for the expenditure of the available balance was submitted June 25, 1900.

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[1] Furnished by Mr. William D. Scott, Fredericksburg, Va.

The sum of $10,000 can be profitably expended during the fiscal year ending June 30, 1902.

Urbana is a port of entry in the collection district of Tappahannock. The nearest light-house is that at Bowler Rock.

Money statement.

July 1, 1899, balance unexpended	$3,534.13
June 30, 1900, amount expended during fiscal year	2,564.81
July 1, 1900, balance unexpended	969.32
July 1, 1900, amount covered by uncompleted contracts	189.62
July 1, 1900, balance available	779.70
Amount (estimated) required for completion of existing project	36,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	10,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations.

The following appropriations have been made:

March 3, 1879	$5,000	September 19, 1890	$3,000
June 14, 1880	2,500	July 13, 1892	3,000
March 3, 1881	4,000	August 18, 1894	3,000
August 2, 1882	4,000	June 3, 1896	3,000
August 11, 1888 (included in an appropriation of $15,000 for Rappahannock River)	3,000	March 3, 1899	3,000
		Total	33,500

CONTRACT IN FORCE.

John Miller, for dredging 10,000 cubic yards, more or less, at 19 cents per cubic yard. Date of contract, October 26, 1899; approved November 4, 1899. Date for commencement, December 1, 1899; date for completion (including dredging in Rappahannock River, Virginia, under the same contract), April 30, 1900; extended to August 30, 1900. (Dredging at Urbana Creek, Virginia, under this contract was completed February 13, 1900.)

COMMERCIAL STATISTICS.[1]

Calendar year.	Reported by Mr. F. A. Bristow.	Reported by Mr. J. D. Gressitt.
	Tons.	*Tons.*
1891	19,500	22,100
1892	20,095	17,125
1893	55,885	61,290
1894	82,395	88,305
1895	66,530	92,320
1896	137,485	133,925
1897	153,875	181,500

[1] Commercial statistics received for 1898 and 1899 are not in a form to be used.

The principal articles of commerce are oysters, tobacco, railroad ties, coal, grain, and lumber.

Arrivals and departures of vessels, 1899.

Description.	Reported by Mr. F. A. Bristow.	Reported by Mr. J. D. Gressitt.
Steamers drawing—		
10 feet or more	600	700
Less than 10 feet	1,000	1,100
Sail vessels drawing—		
10 feet or more	200	300
Less than 10 feet	2,000	2,400
Barges, flatboats, etc	60	60
Total	3,860	4,560

A daily mail steamer line, running from Carters Creek, or Irvington, to Urbana, was established during 1896. It is reported that the work done on this improvement has greatly reduced freight rates and permitted the use of larger vessels.

L 8.

IMPROVEMENT OF HARBOR AT MILFORD HAVEN, VIRGINIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

Under date of July 27, 1899, proposals were invited by public advertisement for dredging at the bar at the entrance to Milford Haven, Virginia. Proposals were opened August 26, 1900, and an abstract of proposals received is appended to this report. The contract was awarded to A. M. Clegg & Co., of Washington, D. C., the lowest bidders. By the terms of the contract the work of dredging was to commence on or before October 15, 1899, and to be completed on or before April 30, 1900. The contractors' dredge did not reach Milford Haven until October 19, 1899, and was in a bad state of repair upon its arrival. It was further injured by breaking machinery and damaging the hull in engaging in wrecking operations, as reported, for private parties, and was taken to Carters Creek for repairs. While at Carters Creek the dredge, as reported, attempted to do some dredging for private parties, and during these operations the boiler exploded. The dredge finally returned to Milford Haven, where repairs to the boiler were undertaken. After waiting over two months from the time when the work should have begun, not one yard having been dredged and the repairs not being completed, the contract was annulled December 23, 1899.

Under date of January 13, 1900, proposals were again invited for this work. Only one bid was received, that of the Norfolk Dredging Company, of Norfolk, Va., with whom a contract was entered into for the work.

Dredging under this contract was begun April 24, 1900, and was in progress at the close of the fiscal year. For various reasons the work has not proceeded as rapidly as was expected, only 9,825.7 cubic yards having been excavated. Still this has provided a channel 10 feet deep at low water, with a minimum width of about 50 feet entirely through the outer bar.

The application of the unexpended balance of the appropriation to the inner bar was authorized by act of Congress approved June 6, 1900. This work will be undertaken upon completion of the dredging of the outer bar, though about $5,000 additional will be required if it is to be completed to the same dimensions as the outside channel.

The river and harbor act of Congress, March 3, 1899, contained the following appropriation:

> Improving harbor at Milford Haven, Virginia: Completing improvement in accordance with the project printed in House Document Number Two hundred and ninety-nine, Fifty-third Congress, third session, twelve thousand five hundred dollars.

Milford Haven is in the collection district of Newport News, Va., which is the nearest port of entry. The nearest light-house is Wolf Trap, in the Fifth light-house district.

Money statement.

July 1, 1899, balance unexpended		$12,492.00
June 30, 1900, amount expended during fiscal year		1,510.21
July 1, 1900, balance unexpended		10,981.79
July 1, 1900, outstanding liabilities	$161.00	
July 1, 1900, amount covered by uncompleted contracts	7,804.00	
		7,965.00
July 1, 1900, balance available		3,016.79

Appropriation.

The following appropriation has been made:

March 3, 1899	$12,500

Abstract of proposals for dredging at Milford Haven, Va., received in response to advertisement dated July 27, 1899, and opened August 26, 1899, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence October 15, 1899; complete April 30, 1900.]

No.	Name and address of bidder.	34,000 cubic yards, per cubic yard.	Amount.
1	A. M. Clegg & Co., Washington, D. C	$0.14¾	$5,015.00
2	John Miller, Washington, D. C	.17⅗	5,984.00
3	James Caler, Norfolk, Va	.24½	8,330.00
4	P. Sanford Rose, Incorporated, Jersey City, N. J	.29½	10,030.00

Abstract of proposals for dredging at Milford Haven, Va., received in response to advertisement dated January 13, 1900, and opened February 12, 1900, by Lieut. Col. Charles J. Allen, Corps of Engineers.

[Commence on or before May 1, 1900; complete within ninety days from date of commencement.]

No.	Name and address of bidder.	34,000 cubic yards, per cubic yard.	Amount.
1	Norfolk Dredging Co., Norfolk, Va	$0.24	$8,160.00

CONTRACTS IN FORCE.

A. M. Clegg & Co., for dredging 34,000 cubic yards, more or less, at 14¾ cents per cubic yard. Date of contract, September 16, 1899; approved, September 29, 1899. Date for commencement, October 15, 1899; date for completion, April 30, 1900. This contract was annulled December 23, 1899.

Norfolk Dredging Company, for dredging 34,000 cubic yards, more or less, at 24 cents per cubic yard. Date of contract, March 5, 1900; approved, March 19, 1900. Date for commencement, on or before May 1, 1900; date for completion, July 23, 1900.

COMMERCIAL STATISTICS.

There are no available commercial statistics for this work.

L 9.

IMPROVEMENT OF YORK RIVER, VIRGINIA.

WORK OF THE FISCAL YEAR ENDED JUNE 30, 1900.

While on the way up the Pamunkey River to conduct snagging operations, the United States snag boat placed 10 fascines and 2 mattresses, weighted with sand bags, around the lower end of the dike at West Point Bar in order to check erosion by the tidal current which had taken place. The work was done by hired labor.

An examination of the channels was made in May, 1900, and a project for expenditure of the available funds was submitted and approved. This project provides for dredging and repairing and strengthening dike.

The sum of $10,000 can be profitably expended during the fiscal year ending June 30, 1902, in dredging and maintenance of dike and channel.

DECISION IN OYSTER BED CLAIMS CASES.

An interesting event of the fiscal year relating to the improvement was the decision of the United States circuit court in the Fourth circuit (eastern district of Virginia) in the cases of A. P. and G. W. Richardson *v.* United States and George E. Brown and James H. Signaigo *v.* United States, rendered March 14, 1900. These parties brought suit against the United States for damages arising from alleged injury to oyster beds resulting from the improvement. In both instances the verdict was rendered in favor of the United States.

This work is in the collection district of Richmond, Va., which is the nearest port of entry. The nearest light-house is Bell Rock, in the Fifth light-house district.

Money Statement.

July 1, 1899, balance unexpended	$15,771.30
June 30, 1900, amount expended during fiscal year	4,194.53
July 1, 1900, balance unexpended	11,576.77
July 1, 1900, outstanding liabilities	20.00
July 1, 1900, balance available	11,556.77
Amount (estimated) required for completion of existing project	69,050.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	10,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations.

The following appropriations have been made:

June 14, 1880	$10,000
March 3, 1881	25,000
August 2, 1882	25,000
July 5, 1884	20,000
August 5, 1886	18,750
August 11, 1888	30,000
September 19, 1890	30,000
July 13, 1892	$35,000
August 18, 1894	20,000
June 3, 1896	16,000
March 3, 1899	10,000
Total	239,750

These appropriations have been applied to work under the original project of 1880, the amended project of 1884, and the further amended project of 1887.

COMMERCIAL STATISTICS.

[Furnished by Mr. E. T. Lamb, Westpoint, Va.]

Receipts and shipments.

Class of goods.	1891.	1892.	1893.	1894.
	Tons.	*Tons.*	*Tons.*	*Tons.*
Coal	10,960	10,498	10,423	20,000
Cotton	89,227	63,742	67,485	72,235
Farm produce	5,641	3,500	4,000	5,000
Grain	3,220	....	100	150
Iron	43,897	45,501	45,033	41,227
Lumber	7,848	6,081	7,375	8,175
Oysters	12,400	2,780	3,200	2,500
General merchandise	70,930	191,462	188,054	206,706
Railroad ties	14,140	5,000	6,500	1,600
Tobacco	175	8,500	10,000	12,115
Wood	45,900	8,495	9,220	10,000

Vessels arriving and departing.

Class.	1891.	1892.	1893.	1894.
Steamers drawing 10 feet or more	727	724	792	758
Steamers drawing less than 10 feet	104	208	311	310
Vessels drawing 10 feet or more	178	96	90	95
Vessels drawing less than 10 feet	824	190	204	200
Barges, flatboats, etc	191	18	21	10

Repeated efforts were made to obtain commercial statistics for years subsequent to 1894, but they could not be obtained. From information procured by Mr. W. B. Harrison, surveyor, of this office, it appears that while the commerce of the river is of less importance at present than in former years, there is still a considerable passenger and freight traffic between Westpoint and Baltimore and locally on the river, the principal articles of commerce being tobacco, railroad ties, wood, machinery, iron, salt, farm produce, and manufactured articles, carried in vessels drawing from 12 to 20 feet of water, two of them being foreign steamers. Practically all of the freight which passes over the Southern Railway between Baltimore and Richmond goes by the York River route.

L 10.

IMPROVEMENT OF MATTAPONI RIVER, VIRGINIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

The snagging plant, after completing the season's work upon the Pamunkey, began operations upon the Mattaponi November 18, 1899, and completed the removal of all snags, logs, and similar obstructions between Westpoint and Dunkirk on the 28th of the same month. The obstructions removed were as follows: 24 snags, 4 logs, and a sunken ferry scow.

A project for the expenditure of the available funds in dredging in connection with that at several neighboring works was submitted June 25 and approved June 30, 1900.

BENEFIT TO COMMERCE AND NAVIGATION.

The work already done upon this river has been of benefit to existing commerce, notwithstanding that much of it has had to be done over again, as snags and other obstructions form in greater or less degree after every freshet. Before any work of improvement was undertaken the trade was limited. The total freight tonnage for 1894 was 39,300 tons. In this connection see commercial statistics herewith.

The sum of $3,000 can be profitably expended during the fiscal year ending June 30, 1902, in continuing work under the approved project.

The work is in the collection district of Richmond, which is the nearest port of entry. The nearest light-house is Bell Rock, Virginia.

Money statement.

July 1, 1899, balance unexpended	$4,916.06
June 30, 1900, amount expended during fiscal year	794.74
July 1, 1900, balance unexpended	4,121.32
Amount (estimated) required for completion of existing project	42,300.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	3,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations.

The following appropriations have been made:

June 4, 1880	$2,500	July 13, 1892	$4,000
March 3, 1881	3,300	August 18, 1894	4,000
July 5, 1884	2,500	June 3, 1896	2,500
August 5, 1886	5,000		
August 11, 1888	3,000	Total	29,800
September 19, 1890	3,000		

COMMERCIAL STATISTICS.

Receipts and shipments.

Class of goods.	Calendar year— 1890.	1891.[a]	1892.[a]	1893.[a]	1894.[a]
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Coal					1,000
Farm products		2,400		300	500
Grain		1,000		100	350
Lumber	7,700	1,200	5,500	6,200	6,000
Merchandise	10,400	3,120	15,570	17,820	16,000
Ties	6,900	5,640	5,000	5,260	3,200
Wood	7,650	38,700	6,620	6,740	12,250
Total	32,650	52,060	32,690	36,420	39,300

[a] Furnished by Mr. E. T. Lamb, Westpoint, Va.

Vessels arriving and departing during 1894.

Class.	Number.	Tonnage.
Steam, drawing less than 10 feet	175	9,000
Sail, drawing 10 feet or more	100	30,000
Sail, drawing less than 10 feet	90	15,000
Barges, flatboats, etc	5	400
Total	370	54,400

Repeated efforts were made to obtain commercial statistics for the years 1895–1898, but they could not be procured. From information obtained mainly from Capt. C. H. Denmead of the tugboat *Claribel* it appears that the commerce of the river in 1899 was approximately 44,700 tons, consisting principally of wood, ties, lumber, and grain, carried for the most part in sailing vessels. It is stated that shipments by schooner have largely increased, being about double what they were ten years ago. A steamer makes two trips each way per week between Westpoint and Walkerton, connecting at the latter place with a steam-propelled scow which runs to Aylett, 18 miles above Walkerton.

L 11.

IMPROVEMENT OF PAMUNKEY RIVER, VIRGINIA.

WORK DONE DURING THE FISCAL YEAR ENDED JUNE 30, 1900.

The snagging plant, after completing the season's work upon the Rappahannock and some dike protection upon the York, began operations on the Pamunkey October 19, 1899, and completed the removal of all snags, logs, and similar obstructions found between Whitehouse and 1 mile above Wormley's landing on November 15, 1899. Below Whitehouse no snags were observed or reported. The obstructions removed were as follows: 94 snags, 9 logs, and 41 trees. Upon completion of this work the plant began similar operations upon the Mattaponi.

A project for the expenditure of the available funds in dredging in connection with that at several neighboring works was submitted June 25 and approved June 30, 1900.

The sum of $3,000 can be profitably expended during the fiscal year ending June 30, 1902, in dredging and removal of snags, logs, and wrecks.

The work is in the collection district of Richmond, which is the nearest port of entry. The nearest light-house is Bell Rock, Virginia.

Money statement.

July 1, 1899, balance unexpended	$3,647.99
June 30, 1900, amount expended during fiscal year	766.42
July 1, 1900, balance unexpended	2,881.57
Amount (estimated) required for completion of existing project	7,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	3,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

Appropriations.

The following appropriations have been made:

June 14, 1880	$2,500	July 13, 1892	$3,000
March 3, 1881	2,500	August 18, 1894	2,000
August 2, 1882	2,500	June 3, 1896	2,000
August 5, 1886	5,000		
August 11, 1888	3,000	Total	25,500
September 19, 1890	3,000		

COMMERCIAL STATISTICS.

[Furnished by Mr. E. T. Lamb, Westpoint, Va.]

Receipts and shipments.

Articles.	1893.	1894.
	Tons.	*Tons.*
Coal	....	5,000
Grain	75	750
Ice	5,145	....
General merchandise	100	10,000
Lumber	10,000	1,000
Railroad ties	15,000	15,000
Wood	20,100	10,500
Total	50,420	42,250

Repeated efforts were made to obtain commercial statistics for the years 1895–1898, but they could not be procured. From information furnished by Capt. C. H. Denmead, of the tugboat *Claribel*, it appears that the commerce of the river in 1899 amounted to approximately 44,600 tons, consisting principally of wood, lumber, grain, ties, coal, and general merchandise, carried in sailing vessels.

L 12.

IMPROVEMENT OF JAMES RIVER, VIRGINIA.

The present project for improvement of this river is in accordance with the act of Congress of July 5, 1884. It has in view the obtaining a depth of 22 feet at mean low tide from the sea to Richmond, the channel widths to be 400 feet from the sea to City Point, 300 feet thence to Drewry Bluff, and 200 feet thence to Richmond. The estimated cost of this project, which was a modification of the original project, is $4,500,000. The work for accomplishing this effect has been excavation through shoals by dredges, removal of rock, and construction of dikes and jetties to regulate the waterway in part. Solid rock excavation has constituted a large item of the work, and more of the same remains to be done. It is necessarily costly.

The work of the fiscal year ended June 30, 1900, consisted in excavation of hard and soft rock, cobble stones, and earth from the channel between the lower city line of Richmond and Jetty B, at Rocketts Reef, Goode Rocks, and Richmond Bar. From the city line to the foot of Richmond Bar the distance is between 2 and 3 miles. These localities all lie within the section from Richmond to Drewry Bluff, a distance of 7 miles. In addition, repairs were made to jetties in the section from Richmond to Drewry Bluff where needed, and a dike about 1,200 feet long was constructed along the right bank just below Dutch Gap, which is 14 miles below Richmond.

The material excavated was in part applied to repairing and strengthening jetties, protecting portions of bank, and in construction of the dike below Dutch Gap.

The amount of material excavated during the fiscal year was as follows:

	Cubic yards.
Earth	11,048.52
Cobble stones	1,409.77
Soft rock	4,349.53
Hard rock	6,386.18
Total	23,194.00

The work was done under contract with P. Sanford Ross, Incorporated, of Jersey City, N. J., dated October 2, 1899, and approved October 14, 1899. The contract work was to commence on or before November 3, 1899, and to be completed on or before February 22, 1901.

An abstract of proposals, opened September 14, 1899, is hereto appended.

During the month of June, 1900, the channel between Jetty B, about 900 feet below the city line, and the lower end of Goode Rocks section (Goode Rocks are 1½ miles below Richmond) was examined by this office by means of a sweep. A number of submerged rocks were found, some of them having been probably missed by the drill or by the dredge in the past. These rocks will be promptly removed.

The assistant engineer refers to a reported custom of some of the persons engaged in fishing in the river near Richmond of using stones for anchoring their small boats, and that some of these stones are left in the channel after the day's fishing. Such practice, continued for a number of years, might cause obstructions where least expected.

The sum of $500,000 is estimated as the amount that can be profitably expended during the fiscal year ending June 30, 1902, in continuing rock and other excavation from the channel between Richmond and the foot of Richmond Bar, in repairs and maintenance of jetties, and in widening and deepening the channel by dredging and regulation where necessary below Richmond Bar and mainly at the following-named points:

	Miles below Richmond.
Warwick Bar	4.5
Harrisons Bar	37
Dancing Point Shoal	59.5
Swans Point	64.5
Goose Hill Flats	71

Accompanying is a report in detail by Mr. S. H. Yonge, assistant engineer, of operations for the fiscal year ended June 30, 1900.

Money statement.

July 1, 1899, balance unexpended		$153,147.31
June 30, 1900, amount expended during fiscal year		42,753.59
July 1, 1900, balance unexpended		110,393.72
July 1, 1900, outstanding liabilities	$1,177.00	
July 1, 1900, amount covered by uncompleted contracts	55,026.00	
		56,203.00
July 1, 1900, balance available		54,190.72
Amount (estimated) required for completion of existing project		3,317,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		500,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

Appropriations.

The following appropriations have been made for this work:

July 11, 1870	$50.000	August 2, 1882	$75,000
March 3, 1871	50,000	July 5, 1884	75,000
June 8, 1872	50,000	August 5, 1886	112,500
March 3, 1873	75,000	August 11, 1888	225,000
June 23, 1874	50,000	September 19, 1890	200,000
March 3, 1875	50,000	July 13, 1892	200,000
August 14, 1876	60,000	August 18, 1894	100,000
June 18, 1878	70,000	June 3, 1896	120,000
March 3, 1879	75,000	March 3, 1899	150,000
June 14, 1880	75,000		
March 3, 1881	60,000	Total	1,922,500

Abstract of proposals for deepening and widening channel of James River, Virginia, repairing dike, etc., received in response to advertisement dated August 15, 1899, and opened September 14, 1899, by Lieut. Col. Charles J. Allen, Corps of Engineers.

No.	Name and address of bidder.	Earth excavation.		Cobble excavation.		Hard-rock excavation.		Transporting excavated material below jetty No. 150.	
		Per cubic yard.	4,414 cubic yards.	Per cubic yard.	3,608 cubic yards.	Per cubic yard.	16,393 cubic yards.	Per cubic yard per mile.	176,000 cubic yards.
1	P. Sanford Ross, 277 Washington street, Jersey City, N. J	$0.25	$1,108.50	$0.25	$902.00	$4.45	$72,948.85	$0.01½	$2,640.00
2	Samuel F. Randolph, 80 and 82 Reade street, New York, N. Y	.24$\frac{3}{10}$	1,072.60	.24$\frac{3}{10}$	1,754.22	4.41	72,293.13	.02$\frac{4}{10}$	4,224.00
3	Frank Pidgeon, 315 Madison avenue, New York, N. Y	.70	3,089.80	1.25	4,510.00	6.25	102,456.25	.02	3,520.00

No.	Name of bidder.	Round pine piles, 20 to 25 feet long.		Round oak piles, 20 to 25 feet long.		Round oak piles, 30 to 35 feet long.		White oak wales.	
		Per linear foot.	725 linear feet.	Per linear foot.	2,200 linear feet.	Per linear foot.	1,900 linear feet.	Per M feet B. M.	11,400 feet B. M.
1	P. Sanford Ross	$0.21	$152.25	$0.34	$748.00	$0.34	$646.00	$36.00	$410.40
2	Samuel F. Randolph	.17½	126.88	.17½	332.50	.17½	332.50	36.00	410.40
3	Frank Pidgeon	.35	253.75	.40	880.00	.45	855.00	65.00	741.00

No.	Name of bidder.	Heart pine wales.		Heart pine sheet piling.		Merchantable sheet piling.		Total.
		Per M feet B. M.	2,720 feet B. M.	Per M feet B. M.	48,000 feet B. M.	Per M feet B. M.	14,520 feet B. M.	
1	P. Sanford Ross	$36.00	$97.92	$36.00	$1,728.00	$26.00	$377.52	$83,559.19
2	Samuel F. Randolph	36.00	97.92	36.00	1,728.00	36.00	522.72	83,824.11
3	Frank Pidgeon	55.00	149.60	55.00	2,640.00	50.00	726.00	139,312.70

No.	Name of bidder.	Wheeling excavated material.		Estimated amount of contract.	Commence—	Complete—
		Per cubic yard per mile.	15,000 cubic yards.			
1	P. Sanford Ross	$0.06	$900	$84,459.19	Within 20 days after approval of contract.	Within 16 months after date of commencement.
2	Samuel F. Randolph	.09	1,350	85,174.11	do	Do.
3	Frank Pidgeon	.40	6,000	145,312.70	do	Do.

CONTRACT IN FORCE.

P. Sanford Ross, Incorporated, for dredging, removing rock, repairing jetties, and constructing dike. Estimate amount of contract, $84,460. Date of contract, October 2, 1899; approved October 14, 1899. Date for commencement, on or before November 3, 1899; date for completion, on or before February 22, 1901.

COMMERCIAL STATISTICS.

Receipts and shipments by water during the calendar year 1899.

Articles.	Port of Richmond, Va.			Points on James River other than Richmond, Va.			Total tonnage.
	Receipts.	Shipments.	Amount.	Receipts.	Shipments.	Amount.	
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Asphalt blocks, brick, etc	224	14,390	14,614	545	*a* 12,000	12,545	27,159
Coal	53,248	36	53,284	*a* 652	115	767	54,051
Cement, lime, etc	11,744		11,744	*a* 1,012	7	1,019	12,763
Cattle				32	324	356	356
Cotton					8	8	8
Caviare					12	12	12
Cord wood	938	981	1,919	750	34,103	34,853	36,772
Dry goods				810	100	910	910
Fertilizer and fertilizer material	51,777	5,119	56,896	*a* 7,070		7,070	63,966
Flour		4	4	293	20	313	317
Fish and oysters	1,125	1	1,126	45	245	290	1,416
Fruit				31	133	164	164
Groceries				304		304	304
Grain	6,867		6,867	518	1,554	2,072	8,939
General merchandise	57,074	34,733	91,807	*a* 1,886	1,397	3,283	95,090
Hay, straw, etc	108		108	1,146	830	1,976	2,084
Hogs				11	39	50	50
Horses				204	66	270	270
Ice	750		750	350	100	450	1,200
Lumber	204	3,069	3,273	11	144,785	144,796	148,069
Logs	41,345		41,345	50	8,050	8,100	49,445
Molasses				83		83	83
Machinery	230	2,454	2,684	2,068	59	2,127	4,811
Oil	*a* 1,600		1,600	169		169	1,769
Oyster shells					175	175	175
Peanuts					553	553	553
Potatoes				133	60	193	193
Railroad ties		34,490	34,490		8,724	8,724	43,214
Salt	4,902	1	4,903	406		406	5,309
Sand	12,054		12,054				12,054
Sheep				9	94	103	103
Salt meats				103	5	108	108
Vegetables					85	85	85
Total	244,190	95,278	339,468	18,691	213,643	232,334	571,802

a Partly estimated, no reports being received from some of those to whom application for statistics was twice made.

The amounts reported for 1898 were used as follows:

Receipts.

	Tons.
Coal	100
Fertilizer	5,180
General merchandise	230
Lime	1,000
Oil	1,600
Total	8,110

Shipments.

Brick	12,000

Arrival and departure of vessels during the calendar year 1899.

Class.	Port of Richmond, Va.	
	Number.	Tonnage.
Steam, drawing 5 to 16 feet	1,150	1,168,284
Sail, drawing 4 to 17 feet	500	110,884
Barges, etc	728	151,148
Total	2,378	1,430,316

Returns for points on James River below Richmond, Va., were too incomplete for report.

SHIP CONSTRUCTION AT RICHMOND, VA., BY WILLIAM R. TRIGG COMPANY, SHIPBUILDERS.

Launched.—Two torpedo boats (*Shubrick* and *Stockton*), each 175 feet long, speed 26 knots.

On the stocks.—Two torpedo-boat destroyers (*Dale* and *Decatur*), each 245 feet long, speed 28 knots; 1 steamer for Kongo River, Africa, 70 feet long.

Vessels contracted for.—Two United States revenue cutters (*Nos. 7* and *8*); 1 protected cruiser No. 17 (*Galveston*), 3,000 tons; 1 Chesapeake and Ohio Railroad fast passenger steamer; 1 submarine torpedo boat, Holland type.

Launched during the current year and having machinery, etc., installed.—One torpedo boat (*Thornton*), 175 feet long, speed 26 knots.

REPORT OF MR. SAMUEL H. YONGE, ASSISTANT ENGINEER.

United States Engineer Office,
Richmond, Va., July 3, 1900.

Colonel: I have the honor to submit my report of operations pertaining to improving James River, Virginia, for the fiscal year ending June 30, 1900.

Under date of June 26, 1899, I was notified by you of the approval of the Chief of Engineers, United States Army, on June 24, 1899, of your project of June 19, 1899, for continuing the improvement of James River, Virginia, under act of Congress appropriating $150,000, approved March 3, 1899.

The above project provides for continuing the excavation of the channel between Richmond and Drewry Bluff by extending it through Rocketts Reef from Jetty B to the lower city line of Richmond and enlarging it at Goode Rocks and the upper part of Richmond Bar from its present dimensions to 150 by 18 feet; making repairs to jetties necessary for their preservation and maintenance, and constructing a training dike on the right bank immediately below Dutch Gap Cut-off for maintaining a stable regimen in that part of the river.

In accordance with your instructions, specifications for proceeding with the improvement under contract were prepared and submitted.

In response to your advertisement of August 15, 1899, proposals for performing the work were received and opened by you at this office September 14, 1899, and award made to P. Sanford Ross, Incorporated, of Jersey City, N. J. This company entered into a contract with the United States October 2, 1899, approved by the Chief of Engineers October 14, 1899.

CONSTRUCTION OF TRAINING DIKE BELOW DUTCH GAP CUT-OFF.

In 1899 2,800 feet of the right shore in the lower part of the cut-off formed by Dutch Gap Canal and the adjoining 1,400 feet below were protected by a pile-and-brush structure closely following the shore line, of which the portion near the downstream end is now in a more or less unserviceable condition. It consists of two lines of piling 6 feet apart, with the piles on each line 8 feet from centers, inclosing loose brush held in place by wires. The part of the river bank situated in the cut-off above Dutch Gap is not subjected to stress. Along the lower 800 feet of the pile-and-brush dike and for about 300 feet below it, however, there appears to have been a slight shore erosion, a part of which, I am informed, is the result of dredging done several years ago by the adjacent riparian owner, to get material for a levee to protect his land, which at this point is low, against overflow.

A survey of this locality in June, 1899, furnished evidence of a movement of the channel toward the right shore since 1892, amounting for a part of the 18-foot contour to about 6 feet (Plate I).

The purpose of the new dike is to secure a stable regimen for the reach immediately below Dutch Gap Canal by checking the above movement, and, incidentally, to prevent bank erosion under the impact of flow out of the canal during freshets.

The dike was placed as near as possible to the channel side of the old work. It masks about 1,200 feet of shore, to which it is connected at each end by a wing extending into the bank.

The structure consists of a single line of oak piles 10 feet from centers, driven to penetrations of 9 to 15 feet, with two lines of 6-inch by 8-inch oak wales in 22-foot lengths bolted to their shore faces. One line of wales is slightly above extreme high tide, the other at a 6-foot lower elevation. All-heart pine sheet piling 3 inches thick, driven from 3 to 10 feet, is spiked to the channel faces of the wales. The sheet piling is further secured by an all-heart pine wale 4 inches by 6 inches in 20-foot lengths, lying in the plane of the upper oak wale, to which it is bolted through the sheet piling by ¾-inch screw bolts at intervals of about 3½ feet. The total length of dike, including shore connections at the upstream and downstream ends, which are 70 feet and 78½ feet long, respectively, is 1,212.3 feet. Its construction was begun October 25 and completed December 28. Between December 20, 1899, and February 20, 1900, the dike was revetted on both faces to slightly above high water, and at its shore ends to the top of the bank with 3,449.35 cubic yards of excavated material. The cost of the dike structure amounted to $3,309.18.

JETTY REPAIRS.

The jetties constructed on James River for regulating and maintaining the channel are 186 in number. They consist of a wooden core formed of a line of pine piling, supporting sheet piling enveloped by material procured in channel excavation, consisting largely of rock of all sizes from spalls to masses weighing several tons.

Although the ballast extends to the top of the core for a few of the jetties, which will hereafter require little or no repair beyond replacing the ballast where it settles, the greater number are more or less incomplete in this respect on account of the supply of hard rock obtained from excavating the channel never having been adequate for this purpose. Until the ballasting is entirely completed renewals of parts of the woodwork weakened through natural decay and destroyed by ice movement and freshets will be necessary.

Repairs of this character were made to 24 of the jetties between December 28, 1899, and March 31, 1900, at an aggregate cost of $900.31.

Of the jetties repaired 7 were situated in Wards Reach, 3 in Willis Reach, 4 in Ferry Reach, 5 at Varina, and 5 at Curles Neck. Twenty oak piles, projecting 10 to 15 feet above high water, were driven at the channel ends of jetties and on training dikes between Richmond and Drewry Bluff, to indicate to navigators the positions of these works when submerged. The cost of the marking piles amounted to $230.18.

EXCAVATING CHANNEL.

For proceeding systematically with excavation the channel is divided into longitudinal strips 25 feet wide, designated cuts, numbered from right to left (facing downstream) 1, 2, 3, etc.

The alignment of the operating plant while drilling blast holes and dredging is controlled by substantial ranges placed on shore. Operations are, as far as practicable, confined to one cut until completed.

The length of the channel section it is proposed to excavate on Rocketts Reef is 775 feet. It is to have when completed a width of 100 feet and a minimum depth of 18 feet below mean low water.

In 1898 excavation was carried on in the lower 604 feet of Cut 1, or for about 20 per cent of the whole section, over the greater part of which a depth of 18 feet was obtained.

Under the existing contract operations included excavation of areas in Cut 1 not meeting the depth requirement, extending the excavation of that cut to the city line for a distance of about 172 feet, excavating Cuts 2 and 3, dredging the loose material overlying the rocky bed in Cut 4 and blasting about 60 per cent of its area.

Estimating the removal of detached masses of rock by hoisting after the final dredging at 15 per cent, none of which former class of work has yet been carried on, and assuming the work done in blasting Cut 4 as equal to half of the excavation of its area blasted, this section may be considered as 70 per cent completed, of which about 56 per cent has been accomplished under the present contract.

The length of channel on Goode Rocks section under excavation is 1,914 feet, its area 103,500 square feet. While widening the channel in this section to 150 feet its alignment is being improved by giving it but one change of direction where there are now three.

About 43 per cent of the work proposed under the present contract for this section has been completed.

The upper part of Richmond Bar, on which the channel is being widened, has a length of 2,060 feet and an area of 91,000 square feet.

The work has consisted of dredging principally loose material, comprising bowlders, cobblestones, and a considerable quantity of sand. The dredging uncovered detached areas of hard rock, amounting to about 3,000 square feet, lying at a higher elevation than 18 feet below mean low water, and situated principally in the lower half of the section. It is estimated that 70 per cent of the volume of excavation required for this section is completed.

Drilling and blasting.—As in former contract, no method is prescribed in the specifications of the existing one governing drilling and blasting. The holes are placed at intervals of about 5½ feet on lines 6 feet apart, approximately normal to the direction of the channel under excavation. The drilling machinery, as well as plant required for other branches of the work, is furnished by the contractors. It consists of an Ingersoll steam churn drill, mounted in leads on a scow 45 feet long by 32 feet wide. The drill bits are 3¼ inches diameter, making a hole large enough to receive a brass loading tube, through which cartridges 2½ inches diameter, containing 75 per cent nitroglycerin, are conveyed from the deck of the drill scow to the bottom of the blast hole.

The plan of simultaneously firing one or more lines of holes is generally followed and is manifestly an improvement over that formerly employed of firing holes singly. The superiority of this plan arises from not having to move the drill scow out of the danger zone of the blast so frequently, thereby effecting a saving in time and, through the combined effect of several charges, obtaining a more thorough excavation across the entire cut. Another advantage of the multiple over the single blast consists of its leaving a larger per cent of rock surface favorable for subsequent drilling, one of the usual effects of a blast being to cause cracks to form in the adjacent rock, which, being very difficult, if not impossible, to drill into, cause loss of time when encountered by making it necessary to move the drill scow. This plan also results in a less symmetrical spacing of the blast holes.

Shortly after the blasting was begun, it being evident from former experience that the depths to which the holes were being drilled would result in excavating to a much greater depth than required, a limit of 22 feet below mean low water was placed on the depth of the holes. This has proved more than sufficient except for a small percentage of the area blasted where the rock was probably unusually dense and tough. For this condition the remedy should consist of placing the holes closer than 5½ by 6 feet. As there is no inexpensive way of determining the toughness of the rock in advance, the remedy can only be applied in a second blasting. This appears to have been necessary in carrying on work under former contracts.

In the excavation made on Rocketts Reef 60 per cent of the area excavated in Cut 2 was 0.7 foot below the 19-foot plane. In Cut 1, 53 per cent was at an average depth of 0.53 foot below the same plane.

With a view to determining the effect of the blasting in producing excavation, a record was kept of the charge of explosive used, the thickness of the loose material overlying the rock bed, and the penetration of the drill into the latter. A record was also kept of the position of each blast hole as located by shore ranges. After the blasted material was dredged soundings were made over the area blasted at intervals of 2¾ feet across the channel and 2½ feet in its direction. By platting, in connection with the blast holes, the soundings made after dredging, the excavating effect at each hole was ascertained. A part of this work, viz, for 161 blast holes, was studied by platting the penetrations of blast holes in hard rock as ordinates and the depths of resulting excavation as abscisses. By the method of least squares, the line best fitting the observations, and therefore representing the relation between depth of blast hole in solid rock and the resulting excavation, was determined to be a parabola, with its axis horizontal, whose general equation is $x = Ay^2 + By + C$, in which x represents the depth in feet of blast hole, y that of resulting excavation, both in hard rock, and A, B, C, constants. The values of A, B, and C being determined and inserted, the equation with reference to these particular observations was found to be $x = 0.102y^2 - 0.48756y + 1.9656$. This equation shows that most of the blast holes were too deep and some too shallow.

On account of variations in the toughness of the rock and of other physical conditions which it is infeasible to predetermine and take into account, it is impossible to arrive at a law for exactly determining the depth of blast hole required to produce the desired depth of excavation at every point. For the area of 5,000 square feet, from which the observations that have been investigated are derived, the volume of excess excavation—i. e., from below the required depth of 18 feet below mean low water—amounted to 190 cubic yards; that of deficient excavation to 14 cubic yards.

The application of the equation reduces the excess excavation to 94 cubic yards, or to less than half the actual, and increases the deficient excavation to 22 cubic yards, or about 50 per cent.

The above applied to the present contract, covering an area of excavation of about 176,000 square feet, would result in a probable reduction of excess excavation of about 3,000 cubic yards and an increase of deficient excavation of about 280 cubic yards, both in hard rock.

As the overdepth excavation for the area from which these deductions are made is less than for some other parts of the work, the above estimated saving by employing the equation would probably be greater than shown above.

Although excavation to a greater depth than contemplated under present requirements, not exceeding 22 feet, is considered to be in line with the general project, the importance and value of being able to control the excavation within reasonable limits, especially when the channel is being deepened hereafter from the depth now sought, viz, 18 feet below mean low water, to that proposed in the project of July 5, 1884, viz, 22 feet below mean water, is evident.

By platting the depths of blast holes in solid rock in feet as abscisses and the corresponding charges of dynamite in pounds as ordinates, it is found that a right line represents the relation between depth of hole and charge of explosive; or, stated otherwise, the charge was directly proportional to the hole depth in rock.

Although there was more or less variation in the charge of explosive for different holes, the average per linear foot of hole for 40,000 square feet at Rocketts Reef amounted to 2.23 pounds, and for about 29,000 square feet at Goode Rocks to 2.74 pounds. Assuming that the dredge removed all material blasted, then, at the former locality, disregarding the loose material overlying the rock, 1 pound of dynamite was expended for blasting 0.225 cubic yards of hard rock. On the same assumption, 1 pound blasted 0.280 cubic yards of hard rock at the latter locality.

The time unavoidably lost by the drill on account of freshets, ice, national holidays, repairs, and moving aggregated 39 days.

Exhibit A contains the principal details of the blasting.

EXHIBIT A.

Details of drilling and blasting for excavating channel, James River, Virginia, during fiscal year ending June 30, 1900.

ROCKETTS REEF, BETWEEN LOWER CITY LINE OF RICHMOND AND JETTY B.

No. of cut.	Period.	Number of blast holes.		Average depth of holes.		Dynamite.	Elevation bottom of holes.	Area blasted.	Time, approximate.
		Drilled.	Fired.	Loose material.	Hard rock.				
				Feet.	*Feet.*	*Pounds.*	*Feet.*	*Sq. feet.*	*Hours.*
1	Oct. 23-31, 1899	84	82	1.89	5.96	1,175.5	22.61	2,500	61.7
1 and 2	Nov. 1-18, 1899	224	224	1.74	4.97	2,217	22.37	10,250	146.8
2	Dec. 1-20, 1899	232	227	2.41	5.41	2,764.6	22.38	10,350	151.9
3	Apr. 2-30, 1900	374	374	1.08	4.17	3,651	21.49	16,900	229
4	June 6-30, 1900	298	291	1.32	4.34	3,425.5	21.00	12,660	197.1
1 and 2	Feb. 8-12, 1900 *a*	14	14	2.33	2.67	127 5	20.53	....	27.9
3	June 11-28, 1900 *a*	21	20	1.59	2.26	183	21.74	....	14.9
		1,247	1,232	1.58	4.66	13,544.1	21.76	52,660	829.3
GOODE ROCKS SECTION.									
5 and 6	Dec. 21-30, 1899	52	47	2.44	4.99	612.2	21.96	1,740	43.8
5 and 6	Jan. 8-31, 1900	199	197	2.53	4.52	2,365.5	22.36	12,212	140.1
5	Feb. 1-28, 1900	112	109	1.58	4.81	1,502	21.84	2,250	95.3
5	Mar. 1-31, 1900	279	275	1.61	4.52	3,535	21.60	11,275	207.9
5	Apr. 30, 1900	2	2	2.50	3.25	15.1	22.10	66	.7
4 and 5	May 1-23, 1900	320	315	2.13	4.04	3,300	21.40	19,382	214.3
		964	945	2.01	4.42	11,147.8	21.73	46,925	702.1
RICHMOND BAR.									
2	May 23-31, 1900	94	94	1.44	2.84	709	21.53	3,135	67.2
2	June 1-5, 1900	76	76	1.18	2.95	622	21.27	2,508	44.3
		170	170	1.27	2.89	1,331	21.41	5.643	111.5
Aggregate		2,381	2,347	1.73	4.42	26,022.9	21.72	105,228	1,642.9

a Second blasting.

Dredging.—A record is kept by a subinspector on the dredge of the exact locality from which each scow load of material is removed. This data will make it possible to closely approximate the proportion of each class of material to be excavated in preparing estimates of quantities for future work.

In excavating Cuts 3 and 4, Rocketts Reef, the loose material overlying the rocky bed was dredged before proceeding with drilling and blasting. This plan is desirable whenever the overlying material includes much sand, as by its removal the liability of the blast holes to being filled and thereby lost, or of the drill being choked, is lessened. It also results in a better separation of the different kinds of material, thus simplifying their classification and expenditure.

Exhibit B contains the details of the dredging.

Exhibit B.

Details of dredging for channel excavation to June 28, of fiscal year ending June 30, 1900.

ROCKETTS REEF, BETWEEN LOWER CITY LINE OF RICHMOND AND JETTY B.

No. of cut.	Period.	Cubic yards dredged.					Area dredged.	Time, approximate.	Remarks.
		Earth.	Cobble stones.	Soft rock.	Hard rock.	Total.			
	1899.						*Sq. feet.*	*Hours.*	
2	Dec. 15-29	203.05	....	439.59	360.44	1,003.08	11,150	74.92	
	1900.								
2	Jan. 8-26	451.46	101.03	706.20	805.17	2,063.88	8,150	78.58	
1	Jan. 26-29	48.15	22.19	69.35	194.33	334.02	4,375	24.25	
3	May 1-11	158	....	489.60	850.47	1,498.07	17,800	90.35	
1	Feb. 17-20	52.51	....	26.26	19.66	98.43	7,600	21.25	Side slope, Cut 1; no blasting.
1	Feb. 21-27	140.30	2.86	7.59	108.15	258.90	....	29.15	Redredging.
2	Feb. 28	95.17	4.98	38.18	53.04	191.37	....	7.25	Do.
2	Mar. 1- 6	70.85	20.27	39.41	92.63	223.16	....	24.33	Do.
3 and 4	Mar. 16-31	1,232.15	137.66	440.82	145.73	1,956.36	37,500	95.16	Initial dredging.
3 and 4	Mar. 31	75.88	25.33	....	.75	102.06	1,000	2	20 feet above Cut 1; no blasting.
Total.........		2,527.62	314.34	2,257.00	2,680.37	7,729.33	87,575	447.24	

GOODE ROCKS SECTION.

No. of cut.	Period.	Earth.	Cobble stones.	Soft rock.	Hard rock.	Total.	Area dredged.	Time, approximate.	Remarks.
	1900.								
6	Jan. 29-31	79.16	32.71	18.89	40.48	171.19	a 4,725	18.10	
6	Feb. 1-16	551.10	13.18	211.86	729.91	1,506.05	6,750	66.15	
5	Mar. 7-15	160.76	4.98	161.22	787.55	1,114.51	9,250	80.70	
5	Apr. 2- 9	119.15	....	97.47	634.51	851.13	7,325	56.25	
4 and 5	May 25-31	194.53	8.92	13.44	239.05	455.94	1,950	42	
4 and 5	June 1-25	1,313.22	92.07	244.69	928.20	2,578.18	19,500	129.75	
4 and 5	June 1-25	845.63	14.57	1.67	15.41	877.28	13,500	24.54	Upper end of section; no blasting.
Total.........		3,263.55	166.43	749.42	3,375.06	7,554.28	63,000	417.40	

RICHMOND BAR.

No. of cut.	Period.	Earth.	Cobble stones.	Soft rock.	Hard rock.	Total.	Area dredged.	Time, approximate.	Remarks.
	1900.								
1 and 2	Apr. 9-30	2,834.12	414.19	389.53	183.20	3,831.04	66,200	141.67	No blasting.
1 and 2	May 1	119.52	21.09	....	5.63	146.24	....	3.75	Do.
1 and 2	May 11-24	2,224.50	425.30	433.29	88.92	3,172.01	15,800	58.83	Do.
	June 25-28	79.21	68.42	520.47	103	771.10	....	31.50	Redredging.
Total.........		5,257.35	929	1,343.29	380.75	7,910.39	82,000	235.75	
		11,048.52	1,409.77	4,349.53	6,386.18	23,194	232,575	1,100.39	

a 2,575 square feet not blasted.

The time lost in dredging on account of freshets, ice, making repairs, national holidays, and moving amounted to forty and one-half days; that on account of not having sufficient number of carrying scows to twenty-two and one-half days.

From data in the table it appears that the performance of the dredge was as follows:

On Goode Rocks section, in removing from an area of 46,925 square feet 6,585 cubic yards, of which 50 per cent was hard rock, the rate was 17 cubic yards per hour; on the same section, where the hard rock removed amounted to about 70 per cent of the excavation, 15.5 cubic yards per hour. On Rocketts Reef, in removing 5,670 cubic yards, of which 43.7 per cent was hard rock, from an area of 41,475 square feet, the hourly rate was 16.2 cubic yards. On Richmond Bar, in removing 7,139 cubic yards from an area of 82,000 square feet the rate was about 35 cubic yards.

The following work performed by the drill and dredge illustrates their relative capacities for this work:

The drill was employed 589.4 hours in working over an area of 40,000 square feet in cuts 1, 2, and 3, Rocketts Reef, which was dredged in 268.1 hours, or in 45½ per cent of the drill's time.

On a surface of 46,925 square feet at Goode Rocks the drill operated 702.1 hours, the dredge removing the blasted rock and loose material overlying the rock in 383 hours, or in about 55 per cent of the time.

Assuming that in operating over the area blasted the dredge removed all blasted material, the performance of that machine was nearly twice as great as that of the drill. On account, however, of the dredge being employed part of the time for removing loose material overlying a part of the rocky bed before drilling was proceeded with, it has thus far been kept occupied.

EXPENDITURE OF EXCAVATED MATERIAL.

On account of the formation of battures out to the stream ends of most of the jetties up to and above low water, especially where they are connected by a longitudinal training dike, little or no area remains accessible to the scows for depositing the light excavated material unsuitable for ballasting jetties, such as sand, where it will not be swept back into the channel. The plan of casting it inside of the training dikes and placing in front of it rock, cobble stones, etc., was initiated at the head of Randolph Flats and carried on for a distance of 3,780 feet between Jetties 52 and 74. Parts of five of the jetties behind the dike were also ballasted.

A part of the excavation was used for reballasting the jetties that were repaired and protecting the bank for about 10 feet above and below their shore ends to prevent their being flanked.

Exhibit C shows the disposition of material excavated under the present contract.

EXHIBIT C.

Quantities of materials excavated from channel and deposited on dikes and jetties during fiscal year ending June 30, 1900.

Point of expenditure.	Material.					Wheeling.	Towage.
	Earth.	Cobble stones.	Soft rock.	Hard rock.	Total.		
Varina:	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Miles.*
Jetty 515	14.61	....	....	49.25	63.86	....	8.45
Jetty 518	73.70	32.18	19.82	108.99	234.69	....	8.45
Jetty 520	126.42	30.35	67.35	140.99	365.11	....	8.45
Jetty 522	250.28	24.74	74.69	226.56	576.27	148.01	8.45
Jetty 526	97.84	8.78	46.77	159.02	312.41	15.59	8.45
Ferry Reach:							
Jetty 301	79.67	4.98	14.94	5.32	104.91	....	3.9
Jetty 300, 303, and 307	155.80	2.86	30.83	155.87	345.36	46.46	3.9
Willis Reach:							
Jetty 251	47.71	....	25.66	86.57	159.94	....	2.52
Jetty 252	119.76	20.27	39.31	317.61	497.05	58.22	2.52
Jetty 254	....	....	11.86	67.04	78.90	87.56	2.52
Ward's Reach:							
Jetty 209	72.90	10.41	20.83	2.02	106.16	....	1.4
Jetty 210	58.88	14.72	24.53	2.58	100.71	....	1.4
Jetty 211	505.24	26.78	89.19	5.05	626.26	....	1.4
Jetty 213	195.10	....	197.62	9.23	401.95	....	1.4
Jetty 214	98.27	16.96	28.82	87.04	231.09	....	1.4
Jetty 215	343.95	71.55	146.49	297.57	859.56	292.28	1.4
Jetty 216	21.96	2.21	57.04	151.19	232.40	35.18	1.4
Curles Neck:							
Jetty 615	111.42	9.98	99.75	408.52	629.66	272.69	14.15
Jetty 617	372.59	42.62	110.71	651.45	1,177.37	512.64	14.15
Jetty 619	304.24	11.27	70.10	273.27	658.88	21.08	14.15
Jetty 621	128.37	17.48	147.03	41.65	334.53	6.76	14.15
Warwick Reach:							
Jetty 50	....	....	....	4.40	4.40	....	....
Jetty 52	41.39	23.15	27.37	53.21	145.12	135.28	....
Jetty 56	60.43	9.45	....	9.67	79.57	79.57	....
Jetty 58	238.64	24.71	....	.52	263.87	263.87	....
Jetty 60	165.29	14.62	....	.22	180.13	180.13	....
Training Dike	6,492.43	838.52	1,493.31	1,519.97	10,344.23	111.90	....
Dutch Gap Dike	755.82	105.25	1,218.91	1,456.13	3,536.11	1,794.07	7.1
Wilton Reach:							
Jetty 148	22.54	19.33	151.47	50.76	244.10	....	....
Jetty 150	26.54	26.54	122.60	35.50	211.18	128.58	....
Totals	10,981.79	1,409.71	4,337.10	6,877.17	23,105.78	4,139.87	....

CONDITION OF THE CHANNEL.

In June, 1900, the channel between Jetty B and the lower end of Goode Rocks section was examined by means of a sweep, consisting of a rectangular frame of gas pipe suspended from two skiffs, which were allowed to drift with the current and were kept in proper line by shore ranges. According to this examination the channel generally has a width of 100 feet and depth of 18 feet at mean low water. Quite a number of submerged rocks, however, were found, single and in clusters, which considerably reduce its efficiency; also two shoals, on which, for short distances, the width for an 18-foot depth is but 25 feet. On account of several submerged rocks the available depth of channel through Goode Rocks section also is reduced to 16½ feet. The width of the section for the above depth is 90 feet.

The cause of the formation of the shoals is indicated by their being situated on the convex side of the channel where it changes direction.

The rocks are probably loose. It is possible, however, that in some instances they are high points of the rocky bed, requiring blasting.

In this connection I would state that I am informed that it has long been the custom of those engaged in fishing in the river near Richmond to use stones for anchoring the small boats employed in that pursuit, which are often left in the channel after the day's fishing. Such a practice continued for any considerable period would obviously result in forming obstructions.

Upon finding the shoals above referred to with the sweep, soundings were made over them. From these it appears that at each shoal there is a depth of 18 feet for a channel varying in width from 25 to 75 feet.

Cross sections of the channel were sounded in June, 1900, at the following localities where there appeared to be some doubt of there being a depth of 18 feet, viz: Warwick Bar, Curles Neck, and Deep Bottom Shoal.

At the first named the 18-foot channel was found to be only about 25 feet wide for a distance of 700 feet, below which it is interrupted by shoals of an aggregate length of 700 feet on which the depth is about 17½ feet. Seven of the jetties on this reach were raised in 1898 with a view to inducing scour during freshets, but according to the above soundings have not produced any improvement. Further contraction on this reach will probably be necessary to obtain an 18-foot channel.

At Curles Neck considerable improvement has occurred since last sounded, in 1898. At that time the 18-foot channel was not fully developed and had a depth slightly under 18 feet. The present channel is 300 feet wide with central depths of 20 feet and upward.

The soundings at Deep Bottom Shoal show a channel over 100 feet wide and 18 to 20 feet deep there in 1895. When the reach was last systematically sounded there was a shoal 100 feet long with less than 18 feet of water.

A noticeable feature in the narrow reaches of the river between Richmond and Curles Neck is the bank erosion, caused principally by waves from passing vessels. This action, although occurring only by small increments, must in the course of time have the effect of directly reducing the channel depth, and, by increasing its width, lessen the scouring effect of the flow necessary for its maintenance.

No examination of the channel was made below Deep Bottom Shoal.

FRESHETS AND TIDES.

An automatic tide gauge belonging to the work was installed at the wharf where the plant is stored in August, 1899, and the maregrams taken since that date partly worked. When completed, the results will be submitted.

The freshets and their approximate periods of duration are tabulated below.

Table of freshets.

Date—1900.	Elevation of crest above zero.	Period above 4 feet above zero.	Date—1900.	Elevation of crest above zero.	Period above 4 feet above zero.
	Feet.	*Days.*		*Feet.*	*Days.*
January 21	9.7	6	March 22	8.0	7+
February 15	8.2	4+	April 19	7.8	7+
February 24	8.3	4	June 18	8.6	5
March 2	11.5	7			

On eighty-four days, or about 25 per cent of the period of observation, the flood tides attained an elevation of 4.5 feet and upward above the zero, and for eleven days, or about 15 per cent of the period, the ebbs reached a lower elevation than 1 foot below the zero.

A great tide of +7.5 feet occurred October 31, and an extreme low tide of −1.7 feet on December 5, the former resulting from a northeasterly gale.

MISCELLANEOUS.

A survey and examination of the reach of river between the lower city line of Richmond and the ship lock, provided for by act of Congress approved March 3, 1899, was made during the fall following, and report submitted December 4, 1899, accompanied by map of shore and wharf lines of the reach and its hydrography; also a profile of the channel based on 33 deep rock borings, and a project, with estimate of cost, for extending the improvement to the head of the reach.

A report on change in harbor line between Shockoe Creek and the ship lock, applied for by the city authorities of Richmond, was submitted under date of April 11, 1900, and the line as changed by authority of the Secretary of War April 23, 1900, staked out.

A bridge was constructed across the river opposite the mouth of Shockoe Creek by the Richmond, Petersburg and Carolina Railroad Company between August, 1899, and May, 1900, in accordance to plan approved by the Secretary of War, under permit dated July 28, 1899.

The wreck of the barge *John Hagan*, sunk in the river at Richmond in July, 1898, was broken up by explosives and removed by the city authorities between August and November, 1899.

During the period of conducting operations the force employed under this office consisted of one inspector and overseer, three subinspectors, one draftsman, and a recorder. Two watchmen were employed for care of plant and two laborers for assisting in field work.

The steam tug *Robert Leslie* was employed intermittently for eleven days for inspecting the work and making soundings.

Very respectfully, your obedient servant,

Saml. H. Yonge,
Assistant Engineer.

Lieut. Col. Chas. J. Allen,
Corps of Engineers, U. S. A.

L 13.

PROTECTION OF JAMESTOWN ISLAND, VIRGINIA.

The following historical sketch, largely from Appendix K to the Annual Report of the Chief of Engineers for the fiscal year ended June 30, 1899, is here given in order to an understanding of the situation regarding this work.

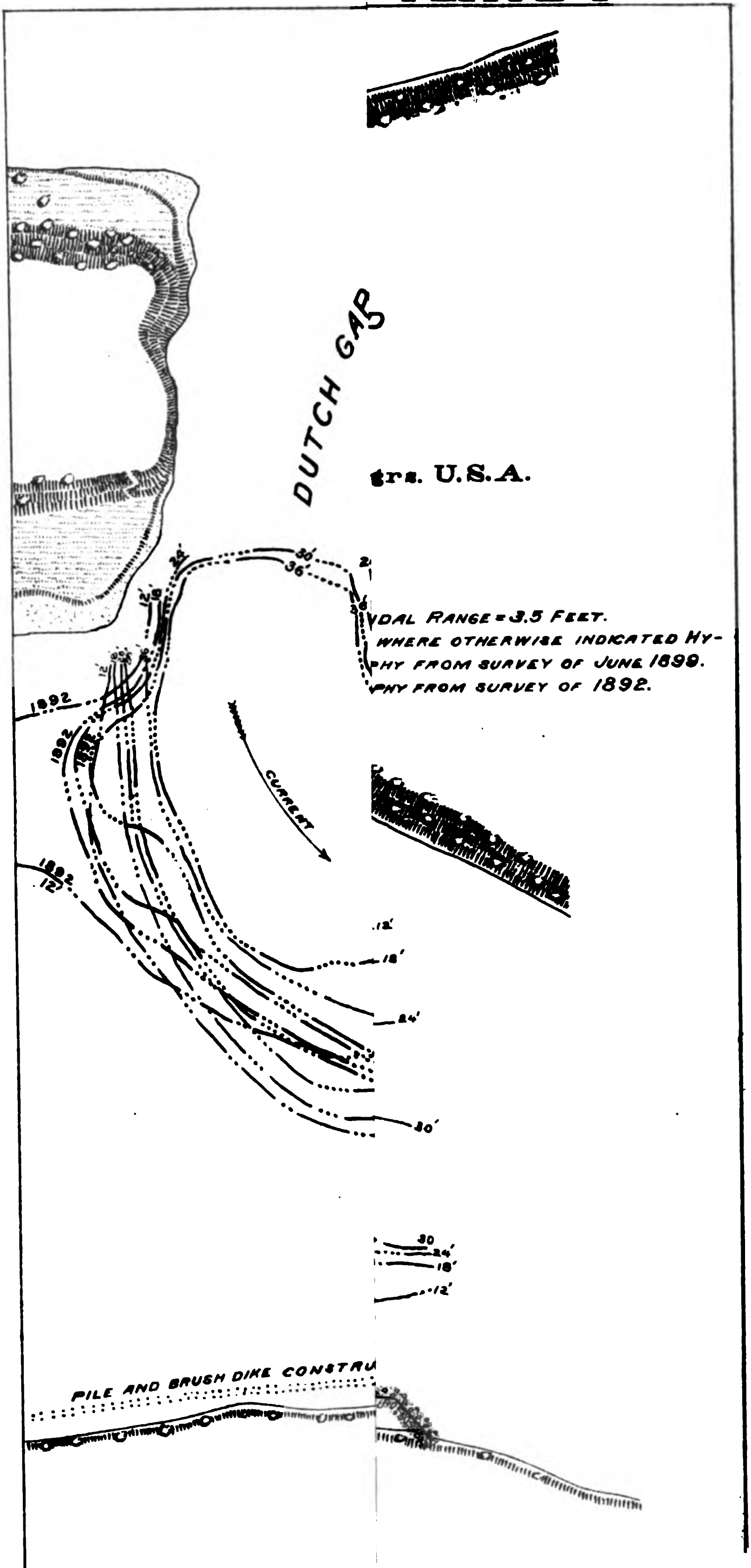
The river and harbor act of August 18, 1894, contained the following item:

> Protecting Jamestown Island from the encroachments of James River, ten thousand dollars, or so much thereof as may be necessary.

Abrasion of the shore of the island had been going on for years. The injury had been caused by the action of the waves raised by the winds, mainly in the broad stretch above. These waves undermined the banks. The worst winds are from northwest to west; next, those from southeast to south; but north and south winds are also hurtful.

The plan adopted was to build a wall faced with granite, laid without mortar, in front of the threatened part of the island, to grade and turf the bluff behind it, and to add several groins in front of the wall. This work was completed June 5, 1895, under contract dated December 26, 1894. Amount expended to June 30, 1896, inclusive, $9,174.92.

PLATE I

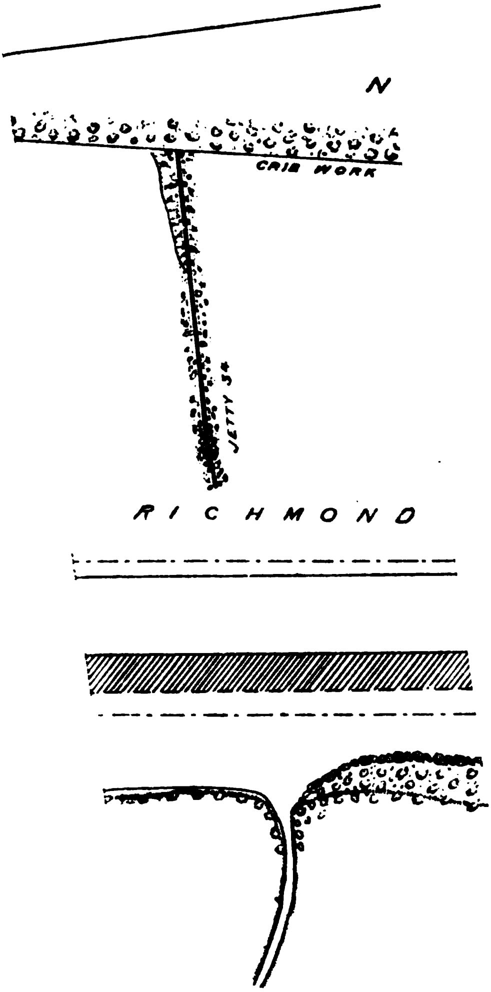


To accompany Lieut. Col. Allen's

PLATE II

JAMES RIVER, VA.

PROGRESS OF THE IMPROVEMENT
AT ROCKETTS REEF
DURING THE FISCAL YEAR ENDING
JUNE 30, 1900,
under the direction of
Lieut. Col. CHAS. J. ALLEN, Corps of Engrs. U.S.A.
S.H.Yonge Asst. Engr.



To accomp

The funds were not sufficient to provide a suitable protection to the soil, most of which was light. The protection work, built under the appropriation of 1894, was seriously injured by storms.

Another appropriation was made for this protective work by the river and harbor act of June 3, 1896, and as follows:

> Protecting Jamestown Island from the encroachments of James River, fifteen thousand dollars, or so much thereof as may be necessary.

The front of the island, where erosion was in progress, was examined during the winter of 1896 and 1897. A project for the protection was submitted in April, 1897, and approved. It was not practicable to commence the work then, however, for the reason that necessary permits for the United States engineers to enter upon the land had not been obtained.

Prior to commencing work of protecting the front of the island under the appropriation of 1894, the engineer officer then in charge secured a permit from the proprietors of said land authorizing him to enter upon the property and put upon it the materials for the necessary structure and then to put up the structure itself to protect the property from the washing of the river; and further, to use any wharves, roads, or other conveniences which he might require.

It was claimed, when the matter came up of continuing the work under the appropriation of 1896, that when the protection work was done under the appropriation of 1894 some of the contractors' men committed depredations upon the said property. The owners thereof were unwilling to take the risk of possible further experience of that nature, and in consequence desired to establish conditions as to workmen and teams occupying or traversing the land that this office could not agree to and which the assistant engineer in local charge considered would practically rule the men off the ground. After more or less correspondence and several interviews by the assistant and myself a map was prepared in October, 1897, in this office, together with a form of permit that it was thought would be unobjectionable, and the two sent to the representative of the party owning the said land. They were not accepted, however, and the matter remained unsettled until June 10, 1899, when a satisfactory permit was received.

It should be said that the owner of the other piece of property that would probably be protected to a small extent gave the necessary permission to enter upon the land.

The length of bank requiring immediate protection is about 2,500 to 2,600 feet.

The necessary permits having been obtained, it was deemed advisable to make a more thorough examination than had previously been made of the eroded bank of Jamestown Island, the examination to include borings, which were much needed. The examination was carried out by Mr. S. H. Yonge, assistant engineer, in local charge of James River improvement work. Mr. Yonge's party commenced the field work in October and completed it in November. The results, with report and map, were submitted in January. A revised plan, suitable to the conditions developed by the examination, was submitted to the Chief of Engineers in May, 1900, and approved by the Secretary of War June 14, 1900.

The plan proposed a revetment of concrete blocks or flagstones, with macadam backing 1 foot thick, laid against the graded bank of the island, the toe of the slope to rest against a strong, low line of sheet piling, to be protected against wave action, if necessary, by stone riprap.

It is hoped and expected that the work, which is to be done by contract, will be commenced at an early day.

The two appropriations made for the work (those of 1894 and 1896), and which are quoted above, simply provide for protection of the island from the encroachments of the river. As about 2,500 to 2,600 linear feet of the island shore were exposed to erosion, the first appropriation was applied, as it appears, in such manner as to protect, so far as funds would permit, the whole extent of front eroded and immediately threatened, that seeming to be required by the wording of the act. There was no reason, so far as known, for the Department to expect that another appropriation for the protection of the island would ever be made. Otherwise it is not at all unlikely that the advisability of holding the said appropriation until another and considerably larger one should be made would have been considered. With the two united, more satisfactory work, not only as to quantity but also as to quality, could undoubtedly have been undertaken.

There does not appear among the records of this office any original official plan or estimate of the cost of protecting Jamestown Island from encroachments of James River.

Money statement.

July 1, 1899, balance unexpended	$15,725.55
June 30, 1900, amount expended during fiscal year	678.57
July 1, 1900, balance unexpended	15,046.98

ABSTRACT OF APPROPRIATIONS.

August 18, 1894	$10,000
June 3, 1896	15,000
Total	25,000

L 14.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Wreck of the barge John Hagan in harbor of Richmond, Va.—The barge *John Hagan*, about 150 feet in length, estimated to have a tonnage of 500 tons, and laden with about 448 tons of coal, sank in the harbor of Richmond, Va., July 3, 1898, as reported by the harbor master in a letter to the city engineer dated April 7, 1899.

The wreck lay in about 10 to 15 feet of water between Jones Rock and the Old Dominion Steamboat Company wharf, and interfered with navigation and turning of large vessels. An examination of the wreck was made June 3, 1899, and correspondence revealed the fact that it had been abandoned by the owners.

On June 30, 1899, a report upon the results of this examination and investigation was made to the Chief of Engineers and the removal of the wreck recommended, the estimated cost of removal being $3,000. This recommendation was approved, and on July 8, 1899, an allotment of $3,000 for removing the wreck was made.

Meanwhile the city authorities of Richmond had contemplated the removal of the wreck at the expense of the city, and there being no apparent objection the removal was left to them. The removal was completed by September 15, 1899.

The work, especially the disposition of pieces, was observed under direction of this office, and an examination made upon the completion of the work showed that the wreck was so removed that none of it could injure vessels navigating the harbor.

No expense was incurred by the United States in connection with the removal of this wreck.

Wreck of the sloop Thomas H. Ruark on Mattawoman Shoal, Potomac River.—The sloop *Thomas H. Ruark* was sunk in about 30 feet of water by collision at the lower end of Mattawoman Shoal, Potomac River, about June 15, 1899.

The sloop was reported as 43 feet in length, 17 feet 3 inches beam, and as having a depth of hold of 3 feet 9 inches. Its displacement is given as 10½ tons. The vessel was built in 1869.

An examination showed it to be in a position to be an obstruction to navigation, and correspondence with the owners showed that it had been abandoned.

On September 22, 1899, a report upon the results of this examination and investigation was made to the Chief of Engineers, and the removal of the wreck recommended, the estimated cost of removal being $125. This recommendation was approved, and on September 27, 1899, an allotment of $125 for removing the wreck was made.

On October 12, 1899, the U. S. steam lauch *Neva*, belonging to this office, with a party including a diver, was sent down to Mattawoman Shoal for the purpose of removing the wreck. About 85 pounds of dynamite were used, and a clear depth of 26 feet of water was secured over the wreck, so that it is no longer an obstruction to navigation. The work was all done by hired labor.

The total cost of preliminary examination, and of work and material for removal of the wreck (including a Laflin & Rand battery for igniting the exploder) was $81.67.

L 15.

EXAMINATION AND SURVEY OF PATUXENT RIVER, MARYLAND.

[Printed in House Doc. No. 170, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 5, 1899.

Sir: I have the honor to submit the accompanying copy of report dated June 10, 1899, of preliminary examination and of report dated November 29, 1899, with map,[1] giving the results of survey of Patuxent River, Maryland, at Bristol Bar, made by Lieut. Col. Charles J. Allen, Corps of Engineers, under provisions of the river and harbor act approved March 3, 1899.

Patuxent River at Bristol Bar was dredged by the United States in 1889 to a depth of 12 feet, but the channel has since shoaled. The improvement now desired is the redredging at this point to a depth of 10 feet at low water and the creation of a turning basin in front of the wharves. In the report of survey, consideration is given to two plans of improvement at an estimated cost of $10,500 and $6,840, respectively, dependent upon the dimensions to be given to the turning basin, the channel dimensions remaining the same in both cases. Colonel Allen gives preference to the project which provides for a basin 300 feet wide and 400 feet in length, with channel 100 feet wide and about 300 feet long leading to deep water below the wharves; all at an estimated cost of $10,500.

---

[1] Not reprinted. Printed in House Doc. No. 170, Fifty-sixth Congress, first session.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF PATUXENT RIVER, MARYLAND, AT BRISTOL BAR.

United States Engineer Office,
Washington, D. C., June 10, 1899.

General: I have the honor to submit the following report of a preliminary examination of Patuxent River, Maryland, at Bristol Bar, made in accordance with the requirements of section 22 of the river and harbor act of Congress approved March 3, 1899:

The Patuxent River discharges into Chesapeake Bay from its right bank, and is navigable from its mouth to Bristol, about 46 miles.

An improvement of the river at Bristol Bar was made by the United States between 1888 and 1891, resulting in a dredged channel 12 feet deep and 120 feet wide. Since that date no work has been done on the channel, which has deteriorated to some extent.

A preliminary examination was made, under my direction, at Bristol Bar, on the 1st ultimo, by Mr. F. C. Warman, assistant engineer, from whose report of examination the following is quoted:

> Bristol Landing is the head of navigation on the Patuxent for boats drawing 9 feet or more, and consequently is the outlet for produce of quite a large section of country. There is a settlement of 200 or 300 persons centering around Bristol Landing and Leon post-office. At Bristol Landing there is located a canning factory, not at present in operation, however. There are two wharves at this place, the upper one belonging to Anne Arundel County and the lower one to the Weems Steamboat Company. This company runs one boat a week to this wharf regularly during the winter and spring and two boats a week during the summer and fall. Very little freight is shipped from the landing except by these steamers, but usually about 200 tons of coal, 10,000 bushels of lime, and 200,000 feet B. M. of lumber are received annually by other vessels. During the past year about 400,000 feet of lumber has been received there for use on the Chesapeake Beach Railroad in excess of the usual amount received.
>
> The statistics of the freight and passenger traffic of the Weems Steamboat Company at this point can be best obtained from their office in Baltimore.
>
> The steamers have no trouble from shoals in navigating the Patuxent River until they get within about 300 feet of the wharf at Bristol Landing. This part of the channel was dredged to a depth of 12 feet in 1889, but has since shoaled, and there is but about 9.5 feet in the channel in front of the wharves and only about 7 feet along the faces of the wharves.

The improvement desired is the dredging in front of the wharf of a turning basin about 200 feet wide, 10 feet deep at low tide, and a little excavation in the channel leading from this basin to the deeper part of the channel. This would require the removal of about 8,000 cubic yards of material.

The following information in regard to the commerce of the locality is taken from a letter, dated May 17, 1899, from Mr. Henry Williams, president of the Weems Steamboat Company, of Baltimore City:

> The number of passengers a year to and from Bristol is about 1,200. The business done at that point is quite large; for 5 or 6 miles around the people have all of their supplies landed at this place and ship all of their crops, etc., from here. The business is mostly done from Baltimore, and I suppose that the value of the goods landed there, which consists of groceries, dry goods, and other articles usually consumed through the country, is fully $75,000. The shipments consist of tobacco, corn, wheat, poultry, eggs, fruit, and other commodities produced in this section of the country. I estimate the value of them at $75,000 at least.

From consideration of the foregoing it is my opinion that the locality is worthy of improvement by the United States, and that a full survey should be made from which to determine the extent and cost of the same. The cost of the survey and of plotting the notes is placed at $75.

Very respectfully, your obedient servant,

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination of Patuxent River, Maryland, at Bristol Bar, has been made.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

[Second indorsement.]

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF PATUXENT RIVER, MARYLAND, AT BRISTOL BAR.

UNITED STATES ENGINEER OFFICE,
Washington, D. C., November 29, 1899.

GENERAL: I have the honor to submit the following report upon a survey of Patuxent River at Bristol Bar, Maryland, made in accordance with the requirements of section 22 of the river and harbor act of Congress of March 3, 1899; also plan and estimate of cost of improvement of the river at that locality.

The survey was made early in October, under my direction, by Mr. William B. Harrison, surveyor. A preliminary examination was made in May, the results of which were duly reported by me under date of June 10.

Bristol Bar was under improvement by the United States Government in 1889, the dredging at that bar having been completed January 2, 1890. The project under which that dredging was done required a depth of 12 feet of water in the channels. About the latter part of 1890, however, it appearing that 12 feet of depth would not be needed, the project for the bars below Bristol was modified so as to call for a free depth of 9 feet.

The map herewith, made from the survey of October last, shows Bristol Bar, which is about 46 miles above the mouth of the Patuxent, as extending from a point above to a point below the two wharves at Bristol Landing, and which are known, respectively, as the County Wharf and the Steamboat Wharf. It also shows that the river in front of the wharves and for some short distance above and below them has shoaled more or less since the completion of the dredging operations of 1890. The soundings shown on the map are reduced to low tide, the range of tide at Bristol Bar being about 2.3 feet.

Bristol is the head of navigation on the Patuxent River for steamers drawing 9 feet or more. It is stated that the steamers at present navigating the river experience no difficulty from shoals until they arrive within about 300 feet of the lower wharf at Bristol Landing.

The improvement desired consists in a small amount of dredging to secure a depth at low water of about 10 feet by a width of about 100 feet throughout this distance of 300 feet, and the creation of a turning basin in front of the wharves, its depth to be about 10 feet.

Two plans (as alternative) are here considered, the dimensions of the proposed dredged channel, 300 feet in length, to be the same in each, viz:

1. A dredged channel, and a turning basin about 300 feet wide by 400 feet in length, with easy approach from the channel, as indicated by red lines on the map. The estimated cost of this plan is as follows:

35,000 cubic yards of dredging, at 25 cents per cubic yard	$8,750
Contingencies	1,750
Total	10,500

This is the preferable plan.

2. If the width and length for the turning basin should be reduced to about 250 feet and 300 feet, respectively, the cost (estimated) would be about as follows:

19,000 cubic yards of dredging, at 30 cents per cubic yard	$5,700
Contingencies	1,140
Total	6,840

The foregoing estimates are based upon consideration of prices of dredging for comparatively small amounts of work. The prices include the towing and the depositing of the dredged material.

As the areas dredged prior to and in 1890 have undergone some shoaling, it is likely that the areas, when dredged again, will require some future retouching by a dredge in order to maintain the created depths.

Very respectfully, your obedient servant,

Chas. J. Allen,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

L 16.

EXAMINATION AND SURVEY OF BRETON BAY, MARYLAND.

[Printed in House Doc. No. 209, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, December 16, 1899.

Sir: I have the honor to submit the accompanying copies of reports, dated June 10 and December 9, 1899, respectively, with map,[1] by Lieut. Col. Charles J. Allen, Corps of Engineers, upon preliminary examination and survey of Breton Bay, Maryland, made to comply with the provisions of the river and harbor act of March 3, 1899.

This bay was dredged by the United States under appropriations made from 1878 to 1890, and in 1891, when the project was completed, the channel was 9 feet deep at low tide up to Leonardtown. This channel has since deteriorated.

The improvement proposed by Colonel Allen contemplates dredging the channel in the bay so as to afford a width of 200 feet up to Leonardtown, and to provide a turning basin at the latter place 600 feet long by 400 feet wide, the depth in channel and basin to be 10 feet at low water, and it is estimated that the proposed work will cost $36,480.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF BRETON BAY, MARYLAND.

United States Engineer Office,
Washington, D. C., June 10, 1899.

General: I have the honor to submit the following report of a preliminary examination of "Brettons Bay," Maryland, on the Potomac River, made in accordance with the requirements of section 22 of the river and harbor act of Congress approved March 3, 1899.

This locality is evidently the one that has been carried in former reports as Breton Bay.

Appropriations for its improvement were made by Congress, commencing June 18, 1878. The last appropriation was by act of Congress approved September 19, 1890. Nine appropriations in all were made, amounting to $37,500. The work of improvement closed in 1892.

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[1] Not reprinted. Printed in House Doc. No. 209, Fifty-sixth Congress, first session.

Breton Bay is about 5 miles in length by a mile in average width. Its port is Leonardtown, at the head of the bay.

The improvement up to 1892 resulted in a good channel nearly a mile in length by 150 feet in width and 9 feet deep, with a turning basin at Leonardtown of same depth, for a length of 600 feet by width of 400 feet.

The preliminary examination of the bay was made on the 30th of May, 1899, under my direction, by Mr. W. B. Harrison, surveyor, from whose report it appears that boats drawing less than 8 feet experience little or no difficulty in navigating the channels, but that vessels of greater draft find difficulty in running the channels at low tide, as well as in turning in the basin.

As to the commerce of the bay, quoting from Mr. Harrison's report:

> The two lines of steamboats running to Leonardtown (population about 450) are as follows:
>
> The Washington Steamboat Company, Limited, *Wakefield*, from Washington and return, once a week, Mondays; traffic, passenger and general merchandise. The Weems Steamboat Company *Potomac* and *Sue*, making conjointly, from Baltimore and return, four a week; from Washington and return, three a week. These boats, besides carrying passengers and merchandise, ship large quantities of tobacco fertilizer from Baltimore in the spring, and tobacco and other agricultural products in the fall. Quite a number of schooners also are engaged in this kind of shipping. Figures and amounts could not be obtained; the wharf keeper is a new comer, having had charge of wharf a short time, and was not posted.

Additional information is given in the following extract from a letter dated May 17, 1899, from Mr. Henry Williams, president of the Weems Steamboat Company, of Baltimore City:

> In Breton Bay, on the Potomac, a channel was cut some years ago which is now nearly filled up, and it is necessary that it should be deepened and widened, making it at least 12 feet deep at low water. The number of passengers to and from Leonardtown is, I judge, about 2,000 a year. The business done from Leonardtown, which is at the head of Breton Bay, is quite large. The town itself and the surrounding country get all their supplies from this place. There are several lines of steamers and a number of sail vessels plying to and from Leonardtown, and I estimate the value of the goods shipped from there at $100,000 and the value of the articles received there at $125,000.

In view of the foregoing, I am of opinion that Breton Bay is worthy of improvement by the United States, and that a full survey should be made at the locality. The cost of the necessary survey is placed at $350.

Very respectfully, your obedient servant,

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of Breton Bay, Maryland, on the Potomac River.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.
By order of the Secretary of War:

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF BRETON BAY, MARYLAND.

UNITED STATES ENGINEER OFFICE,
Washington, D. C., December 9, 1899.

GENERAL: I have the honor to submit the following report upon a survey at Breton Bay, Maryland, on the Potomac River, made in accordance with the requirements of section 22 of the river and harbor act of Congress approved March 3, 1899.

A plan and estimate of the cost of an improvement, based upon the survey, are embodied in this report.

The survey was made November 1–3 last, under my direction, by Mr. William B. Harrison, surveyor.

A preliminary examination of the locality was made in the latter part of May, the results of which were reported by me under date of June 10. In that preliminary report it was noted that the locality was evidently the one that had been carried in former reports (from this office) as Breton Bay.

Breton Bay is a tidal estuary of the Potomac River, which it enters 82 miles below Washington and 24 miles above the mouth of the river at Point Lookout. The bay is about 6½ miles in length, with a width varying from 1,600 to 6,300 feet. A ruling depth of 15 feet at low water is found in the bay through a distance of about 4 miles from its mouth. The harbor affords a safe anchorage for vessels. Leonardtown, situated at the head of navigation, 6 miles above the mouth of the bay, has a population of about 500, and is the county seat of St. Marys County, and a place of summer resort. The surrounding country is productive and tributary to Leonardtown.

A survey of Breton Bay was made in 1874 (please see Report of Chief of Engineers for 1875, Part II, pp. 108–110) which showed that at that time navigation was obstructed by a shoal at the head of the bay extending from the 9-foot contour to the Leonardtown Wharf, a distance of about 1 mile, the least depth on the shoal being 5 feet at low tide.

The original project for improvement, adopted in 1878, provided for dredging a channel 150 feet wide and 9 feet deep from the 9-foot contour in Breton Bay to the Leonardtown Wharf, with a turning basin for steamboats at the wharf 400 feet wide and 600 feet long, at an estimated cost of $30,000. In 1886 the project was amended so as to provide for a channel 200 feet wide and 10 feet deep, the turning basin to be 800 feet long and 400 feet wide. The estimated cost of the amended project was $49,000. In 1890 the original project was resumed, a width of 150 feet and depth of 9 feet being deemed sufficient to furnish all the facilities needed by navigation at that time.

From June 18, 1878, to September 19, 1890, nine appropriations, aggregating $37,500, were made. This sum was applied to dredging 214,229 cubic yards of material. The work called for by the project was completed August 25, 1891. The channel was then 9 feet deep at low tide from the original 9-foot contour in Breton Bay to the Leonardtown Wharf. The width of the channel was 150 feet, and at the turn off Buzzards Point it was made 320 feet to facilitate the turning of steamers. The basin at Leonardtown was 9 feet deep, 370 feet wide, and 600 feet long.

The information obtained from the survey of November last is given on the accompanying map. It will be noticed that while the depth of 9 feet in the channel has maintained itself its width has materially decreased, and that in the turning basin both width and depth are somewhat less than they were at the time of completion of the work in 1891. The changes are due to shoaling.

The improvement desired is almost identical with that provided for in the amended project, 1886. It comprises the dredging of the channel to afford a width of 200 feet and sufficient dredging to provide a turning basin about 600 feet long by 400 feet in width in front of the wharf at Leonardtown, and, as indicated by red lines on the accompanying map, both channel and basin to have depths of 10 feet at low water, at an estimated cost as follows:

152,000 cubic yards of dredging, at 20 cents per cubic yard	$30,400
Contingencies	6,080
Total	36,480

The cost of an improvement to provide a turning basin 500 feet long by 350 feet in width, with channel 150 feet wide, the depth in both basin and channel to be 10 feet, is estimated as $22,560, but such plan would never be as satisfactory to the general public, including the navigation interests, as would the more permanent one of providing a turning basin 600 feet long by 400 feet in width and a channel 200 feet wide leading to it, as given above, the estimated cost of which is placed at $36,480, the channel and basin depths for navigation to be 10 feet.

The foregoing estimates are based upon the best available information as to cost and are believed to be substantially correct. The cost includes the disposition of the dredged material.

Inclosed is a copy of commercial statistics received since the report of the preliminary examination was submitted.

Very respectfully, your obedient servant,

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

COMMERCIAL STATISTICS FOR THE CALENDAR YEAR 1898–99.

[Furnished by F. O. Morgan, merchant; J. F. Neal, lumber dealer; E. B. Abell, treasurer wharf company.]

LEONARDTOWN WHARF, MARYLAND, *November 27 1899.*

Arrivals and departures of vessels.

Description.	Number.	Tonnage.
Steam, drawing less than 10 feet	a3	b1,500
Sail, drawing less than 10 feet	3	b80
Total	6	1,580

a Twice a week each. b Aggregate, about.

The number and tonnage of vessels departing is the same as for vessels arriving.

Principal articles of export and import.

Articles.	Receipts.	Shipments.	Total.
	Tons.	*Tons.*	*Tons.*
Coal	250		250
Farm produce		100	100
Grain		100	100
Ice	10		10
Iron	10	10	20
Lumber	210	250	460
Oysters	10	5	15
General merchandise	100,000		100,000
Railroad ties		50	50
Tobacco		100	100
Wood		500	500
Total	100,490	1,115	101,605

No new lines of transportation have been established.
Rates are less, and larger boats enter.

L 17.

EXAMINATION AND SURVEY OF CARTERS CREEK, VIRGINIA.

[Printed in House Doc. No. 185, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 8, 1899.

SIR: I have the honor to submit the accompanying copy of reports by Lieut. Col. Charles J. Allen, Corps of Engineers, dated June 10, 1899, and December 4, 1899, respectively, upon preliminary examination and survey with a view to improving the mouth or entrance of Carters Creek, Lancaster County, Va., made in pursuance of the requirements of the river and harbor act of March 3, 1899.

This creek, on which are the harbors of Weems and Irvington, has the general characteristics of a tidal estuary rather than of a tributary, and enters the Rappahannock River through its left bank, and has two main prongs, called the Eastern Branch and the Northern (or Western) Branch, respectively. The plan presented by Lieutenant-Colonel

Allen for improvement of the locality contemplates the excavation of a channel to afford a low-water depth of 15 feet through the bar at the mouth of the creek, with a width of 200 feet, including necessary dredging at Crab Point, and the construction of 700 linear feet of jetty. The estimated cost of this work, including contingencies, is $33,900.

Lieutenant-Colonel Allen states that if the width of channel were reduced to 150 feet the cost of improvement would be reduced to $25,600, but such improvement would not be as satisfactory as that giving a channel 200 feet wide.

An estimate for a small amount of dredging in the Eastern Branch near Gallyhook Point, to afford a depth of 12 feet by a width of 100 feet, at a cost of about $1,700 or $1,800, is also submitted. This latter estimate was not called for by the provisions of the act, but is incidentally presented at the request of the citizens of the locality, the soundings being taken without additional cost to the United States.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

PRELIMINARY EXAMINATION OF CARTERS CREEK, LANCASTER COUNTY, VA., WITH A VIEW TO IMPROVEMENT OF ITS MOUTH OR ENTRANCE.

UNITED STATES ENGINEER OFFICE,
Washington, D. C., June 10, 1899.

GENERAL: I have the honor to submit the following report of a preliminary examination at Carters Creek, Lancaster County, Va., made in accordance with the requirements of section 22 of the river and harbor act of Congress approved March 3, 1899.

The examination was made under my direction early in April by Mr. F. C. Warman, assistant engineer in this office. The following is quoted from his report of the examination:

> Carters Creek is located in Lancaster County, Va., and commercially is a very important tributary of the Rappahannock River.
>
> The two main settlements are Irvington and Weems, at each of which places the Weems Steamboat Company has good wharves. The population living along the shores of the creek within 1 mile of its mouth will aggregate 1,200 persons, it being the largest settlement on the Rappahannock below Fredericksburg. Irvington and Weems have two hotels, several stores and churches, and at the former there is an academy.
>
> The main occupations of the inhabitants are connected with the oyster and fish industries. There are two large fish guano companies located here, each having a good wharf. Only one of these companies is in operation at present, although the other is expected to start again soon. The Carters Creek Fish Guano Company of Irvington, which is the one in operation, employs about 150 men and indirectly supports at least 500 persons. Thus, though operated by private parties, it is regarded as a public institution and benefactor.
>
> In addition to the above-mentioned wharves there are about five private oyster wharves located within the creek.
>
> Irvington is spoken of as a possible terminus of the Northern Neck Railroad.
>
> Regular lines of steamers connect Carters Creek with Baltimore, Norfolk, and Fredericksburg. There is one steamer arriving every day, except Sunday, and some days there are two steamers. A small mail steamer runs regularly every day from Carters

Creek to Urbana and hails from Irvington. Aside from this, 3 fishing steamers, 1 of them drawing 15 feet, belong in the creek, and there is a probability of having at least 2 more when the other guano company resumes work. Ten or 12 large sailing vessels and about 300 oyster canoes also belong in the creek.

It is estimated that there are annually about 400 arrivals of large steamers in the creek, 1,400 arrivals of small steamers, 500 of sailing vessels drawing over 9 feet, and about 2,000 of sailing vessels drawing under 9 feet.

Carters Creek has one of the very best passenger wharves on the river. The principal freight shipments consist of oysters, fish, fish guano, and crabs. The trucking interest in the creek is rather small. Statistics for the season 1897–98 show that about 100,000 bushels of oysters were marketed to schooners, and in addition about 30,000 bushels of barreled oysters were shipped by steamers. The value of the former averages at least 50 cents per bushel and of the latter $1 per bushel. Captain Messick, the manager of Carters Creek Fish Guano Company of Irvington, has promised to send statistics of his business to Washington. It will probably amount to about 2,200 tons of fertilizer and 700 barrels of oil annually. This is largely carried to seaport cities outside of Chesapeake Bay by vessels of their own or of their own hiring.

The Weems Steamboat Company has no agent at either of the wharves, and statistics of the freight received by them may be best obtained from their office at Baltimore. These steamers, however, do not carry one-half of the value of the freight shipped. Tens of thousands of dozens of crabs are shipped annually.

Carters Creek has two main branches, called the Eastern Branch and the Western Branch, respectively. The Eastern Branch is navigable for vessels of 9 feet draft for a distance of 2 miles from the mouth of the creek and the Western Branch for a distance of 1 mile. Outside of the mouth of the creek is deep water in the Rappahannock River, and just inside is a considerable landlocked basin, 20 to 24 feet deep. This basin has a good holding bottom, and is much used as a harbor of refuge. It is said to be the best ice harbor for vessels drawing 12 feet on the western side of Chesapeake Bay above York River, especially for tows of barges. Thirty-six schooners and barges have been counted anchored in the harbor at one time, and it is stated that more than half of the schooners that buy oysters in the Rappahannock harbor there.

Between this harbor and the deep water of the Rappahannock River there is a short bar of hard sand, over which there is but 10 feet of water at low tide. This bar frequently prevents the entrance of the larger vessels and fishing steamers, and even the large steamers sometimes strike upon it at extreme low water.

After crossing this bar there is 15 feet or more of water to the steamboat wharf at Weems, 12 feet or more to the steamboat wharf at Irvington, and 12 feet or more to the fish guano companies' wharves, and the bottom is soft mud.

The improvement desired is the dredging of a channel 15 feet deep through the above-mentioned bar just outside of the mouth of the creek, and also the cutting off of the left-hand point at the mouth of the creek, which now necessitates the making of a very bad turn in entering the creek. The length of the bar between 15-foot contours is only about 1,000 feet, and probably not over 25,000 cubic yards of excavation would be required to make a channel of the desired depth and 200 feet wide through it; and the removal of, say, 10,000 cubic yards from the above-mentioned point would materially aid navigation there.

Aside from these obstructions at the mouth of the creek, Gallyhook Point, in the Eastern Branch, has extended out into the channel and renders the navigation somewhat difficult there. The removal of about 3,000 cubic yards would remove this obstruction entirely.

With these improvements the harbor would be a far better harbor of refuge, the steamers would never ground and could enter more readily, and the guano companies could employ larger vessels to ship their product, which is now carried at rather high rates on small vessels, or they are compelled to lighter out to large ones when suitable small ones can not be obtained, as is not infrequently the case.

A detailed survey of the above-mentioned localities in Carters Creek can probably be made in seven or eight days, at a cost not exceeding $300, including making of a map of the same.

Additional information as to the commerce of the locality is given in the following extract from a letter dated May 17, 1899, from Mr. Henry Williams, president of the Weems Steamboat Company, of Baltimore City:

Carters Creek, on the Rappahannock River, should be deepened to at least 12 feet. It has never received any attention from the Government. The number of passengers to and from Carters Creek by our line alone is about 1,500 a year. The business done here is very large. On it are located the two flourishing villages of Weems and Irvington. The oyster trade is quite large. There are two canning factories, fish factories, and other manufacturing enterprises located on its shores; and it is, moreover, a place of refuge for vessels navigating the Rappahannock River. The barges engaged in carrying railroad ties between Fredericksburg and Philadelphia stop here when the weather is unfavorable. I think it very important that the navigation should be rendered safe. The shipments from this creek consist largely of oysters, fish, canned goods, fish oil, fish guano, and country produce. The receipts are groceries, dry goods, and other articles usually consumed by people in this section of the country. The value of the articles shipped from the creek I estimate at $250,000 or $300,000. The goods received, I think, are worth at least $50,000.

The extent of the commerce of Carters Creek and the probable comparatively small outlay needed for removal of the obstructions to navigation of the harbor warrant the opinion that the locality is worthy of improvement by the United States, and that it should receive full survey from which to arrive at plans for improvement and estimate of cost of the same.

The cost of survey needed is here placed at $350.

Very respectfully, your obedient servant,

Chas. J. Allen,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

[First indorsement.]

Office Chief of Engineers,
U. S. Army,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of the mouth or entrance to Carters Creek, Lancaster County, Va.

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. Mackenzie,
Acting Chief of Engineers.

War Department,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War:

John C. Scofield,
Chief Clerk.

SURVEY OF CARTERS CREEK, LANCASTER COUNTY, VA., WITH A VIEW TO IMPROVEMENT OF ITS MOUTH OR ENTRANCE.

United States Engineer Office,
Washington, D. C., December 4, 1899.

General: I have the honor to submit the following report of a survey at Carters Creek, Lancaster County, Va., with a view to improvement of its mouth or entrance, made in pursuance of the requirements of section 22 of the river and harbor act of Congress of March 3, 1899.

A plan and estimate of the cost for improvement based upon the survey are embodied in this report.

The survey was made October 16–19 last, under my direction, by Mr. William B. Harrison, surveyor. A preliminary examination of the locality was made early in April, the results of which were reported by me under date of June 10.

Carters Creek is on the left bank of the Rappahannock River, and about 10 miles above its mouth. The creek has the general characteristics of a tidal estuary rather than of a tributary.

A map[1] of the survey of October, drawn to a scale of 1–2,000, is herewith. The shore line of the creek is very irregular, but there are two main prongs, called, respectively, the Eastern and the Northern Branch (the latter is sometimes called the Western Branch). The Eastern Branch is navigable for vessels of 9 feet of draft for a distance of 2 miles from the mouth of the creek, and the Northern Branch for a distance of 1 mile. Just inside the mouth of Carters Creek is a partly landlocked area of considerable size, with depths of 15 to 20 feet at low tide, and with a good holding bottom.

The mean range of tide is about 1½ feet.

The improvement desired for the mouth or entrance is the excavation of a channel to afford a depth at low water of about 15 feet through the bar, and some excavation of the shoal off Crab Point. A jetty in the Rappahannock River at Crab Point, to intercept the movement at flood tides of material which undoubtedly is a factor in formation and maintenance of the shoal, is provided for in the plan. As in many cases of dredged channels, the necessity for some future retouching by a dredge may be expected.

The material forming the bottom, as found by soundings, was generally sand in the bars and soft mud elsewhere.

Estimate of cost of improvement.

For dredging a channel at the mouth to afford a navigable depth at low water of about 15 feet, with a width of 200 feet, including necessary dredging at Crab Point:	
65,000 cubic yards, at 30 cents per yard	$19,500
700 linear feet of jetty, at $12.50 per foot	8,750
	28,250
Contingencies	5,650
Total	33,900

If the width for the dredged channel were to be reduced to 150 feet the estimate would reduce to about $25,600. An improvement on this basis, however, would not be as satisfactory as that estimated above to cost $33,900, giving a channel 200 feet wide.

The foregoing estimates are based upon the best available information as to cost. They include the disposition of the dredged material.

The map[1] herewith shows by red lines the proposed locations, closely approximate, for the channel (about 1,000 feet long) across the bar at the entrance and for the jetty. On the map is also shown an average cross section for the jetty, which, however, may be subject to slight modification when work upon it begins or progresses.

Some desire was expressed by steamboat interests for the dredging of a channel in the Eastern Branch near Gallyhook Point, to afford a depth of 12 feet by a width of 100 feet. The cost of such a channel would be small—about $1,700 to $1,800—but it is not included in the plan, which relates only to improvement at the mouth of the creek. The soundings in this branch were, as reported, taken while the surveying party was awaiting the arrival of the steamer upon which it was to return.

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[1] Not reprinted. Printed in House Doc. No. 185, Fifty-sixth Congress, first session.

With this report is inclosed a copy of a letter, dated November 28, 1899, from W. L. Messick, general manager of Carters Creek Fish Guano Company, giving some business statistics.

Very respectfully, your obedient servant,

Chas. J. Allen,
Lieut. Col., Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

LETTER OF MR. W. L. MESSICK, GENERAL MANAGER, CARTERS CREEK FISH GUANO COMPANY.

[Carters Creek Fish Guano Company, manufacturers of fish guano and oil; W. L. Messick, general manager.]

Irvington, Va., *November 28, 1899.*

Dear Sir: Per request you will find inclosed reports of tonnage received and shipped by our company for year 1898, also 1899 to date. You will please note the increase in our business in 1899.

I also give you the weekly traffic during the years mentioned above, which are all placed to a great disadvantage by close and shallow water at the mouth of Carters Creek. And a depth of 12 or 13 feet at mean low water would be of great advantage to the fine harbor we have and to the several shipping points situated on Carters Creek, and greatly increase the advantages of the United States mail, which we have twice a day, Sundays excepted.

The inclosed information is about as correct as I can give you. Will be pleased to give any further information I can.

Yours, very truly,

W. L. Messick, *Manager.*

Mr. Chas. J. Allen,
Lieutenant-Colonel, Corps of Engineers.

Statistics of Carters Creek Fish Guano Company, 1898.

[Furnished by the Carters Creek Fish Guano Company.]

Received at works:		
Menhaden fish	tons..	8,000
Coal	do...	3,000
Supplies, etc. (about)	do...	500
Output via Carters Creek:		
Guano	tons..	2,500
Supplies, etc. (about)	do...	1,500

One steamer drawing 13 feet when loaded; one 11 feet. One sail vessel drawing 9½ feet when loaded; one 8 feet.

The Weems Steamboat Company makes 8 runs per week in Carters Creek with their boats.

Besides these, we have a special mail steamer making daily runs from said creek; a great number of oyster boats in winter season; also a marine railway that would be benefited.

P. S.—For the year 1899 to date will add to the tonnage about one-fourth, as we have added to our fleet 1 steamer.

L 18.

PRELIMINARY EXAMINATION OF JACKSONS CREEK, IN MIDDLESEX COUNTY, VA., WITH A VIEW TO REMOVAL OF BAR AT MOUTH.

[Printed in House Doc. No. 98, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 4, 1899.

SIR: I have the honor to submit the accompanying copy of a report, dated June 10, 1899, by Lieut. Col. Chas. J. Allen, Corps of Engineers, of the results of a preliminary examination, with a view to removal of bar at mouth of Jacksons Creek, in Middlesex County, Va., provided for by the river and harbor act approved March 3, 1899.

Colonel Allen is of opinion, concurred in by me, that the locality is not worthy of improvement by the General Government.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. ELIHU ROOT,
Secretary of War.

REPORT OF LIEUT. COL. CHAS. J. ALLEN, CORPS OF ENGINEERS.

UNITED STATES ENGINEER OFFICE,
Washington, D. C., June 10, 1899.

GENERAL: I have the honor to submit the following report of a preliminary examination of Jacksons Creek, Virginia, made in accordance with the requirements of section 22 of the river and harbor act of Congress approved March 3, 1899.

Jacksons Creek is situated in Middlesex County, Va., and is a tidal estuary of Piankatank River, which it enters on the left side about 1½ miles from the mouth of the latter stream. Piankatank River enters Chesapeake Bay on the west side of the bay, just south of the mouth of the Rappahannock River. Jacksons Creek consists of two prongs, 1 and 1¼ miles in length, respectively, their widths varying from 300 to 1,000 feet and their depths from 8 to 10 feet at low tide.

The mouth of the creek is obstructed by a bar extending entirely across it, the bar being a part of the wide shoal or flat which extends along the shore of Piankatank River. The general depth over this bar is 1 foot, except in a small channel near the north shore, where the ruling depth is about 3 feet. The distance across the bar from the 8-foot curve in Jacksons Creek to the 8-foot curve in Piankatank River, on the most desirable line for a dredged channel, is 1,350 feet. A wharf, known as Jackson's wharf, now extends from the north shore of the mouth of the creek across the flat and out to the channel of Piankatank River and serves for the shipment of freight to and from Jacksons Creek. The trade is almost entirely with Baltimore, the steamers of the Baltimore, Chesapeake and Atlantic Railway Company making three round trips a week. There are some farms about Jacksons Creek, and oysters in considerable quantities are obtained in the creek. In 1894 the receipts of freight were estimated by one of the citizens at 200 tons and shipments at 6,550 tons, of which 5,000 tons were stated to be oysters, which are largely shipped by vessels. The annual freight tonnage by steamer was, however, only 884 tons.

A preliminary examination of the creek was made in 1894 by this office, from the records of which all necessary information as to the physical character of the stream was available. In addition, the Baltimore, Chesapeake and Atlantic Railway Company were requested to furnish recent statistics of trade, and a letter has been received from them on the subject. They state that their steamers carried during the year ending August 31, 1898, 1,009 tons of freight, valued at about $34,000. They request a channel 300 feet wide and 10 feet deep.

The mouth of Jacksons Creek is exposed to the full force of northeast to east and southeast storms in Chesapeake Bay, the mouth of the Piankatank River being here open and wide. The wharf is equally exposed, and the steamers and vessels are unable to make a landing there in bad weather. A channel dredged through the shoal, of the dimensions requested, would require the removal of about 175,000 cubic yards of material, at a cost of from $45,000 to $50,000. The channel would be so exposed, however, that it would soon fill up. Jetties might be built and would afford some protection, but these would cost upward of $60,000, and even supposing them built, it can not be said with certainty that the tidal flow of the creek would be sufficient to keep open a channel of the proposed dimensions or even one 200 feet wide.

As to the use of the creek for a harbor of refuge, Milford Haven, 5 miles to the southward, which is about to be improved, affords a much better and an entirely safe harbor.

After a review of the question in the light of the most recent information, the conclusion reached is the same as that following the examination of 1894 (Report of Chief of Engineers, 1895, pp. 1262, 1263), viz, that the large expenditure required for a permanent improvement would not be justified by the limited interests involved.

The creek does not therefore appear worthy of improvement by the Government, and no estimate for a survey is submitted.

Very respectfully, your obedient servant,

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

L 19.

EXAMINATION AND SURVEY OF JAMES RIVER AT RICHMOND, VIRGINIA.

[Printed in House Doc. No. 234, Fifty-sixth Congress, first session.]

OFFICE OF THE CHIEF OF ENGINEERS,
UNITED STATES ARMY,
Washington, December 20, 1899.

SIR: I have the honor to submit the accompanying copies of reports, dated June 10 and December 9, 1899, with map,[1] by Lieut. Col. Charles J. Allen, Corps of Engineers, upon preliminary examination and survey, respectively, of James River (at Richmond), Virginia, with a view of ascertaining what expenditure will be necessary to continue the improvement to the head of navigation at the docks, made to comply with the provisions of the river and harbor act of March 3, 1899.

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[1] Not reprinted. Printed in House Doc. No. 234, Fifty-sixth Congress, first session.

Work of improving this river is now being prosecuted in accordance with a project adopted by Congress in 1884, which provides for obtaining a channel depth of 22 feet at mean low tide from the mouth up to Richmond, with widths as follows: From the mouth to City Point, 400 feet; thence to Drewry Bluff, 300 feet; thence to the lower city limit of Richmond, 200 feet, and 200 feet is assumed by the local officer as the minimum width needed for an extension of the improvement up to the docks.

The plan of improvement presented contemplates the excavation of a channel to afford a free depth of 22 feet at mean low tide, with width of 200 feet, between the lower city line of Richmond and the docks, a distance of about 3,300 feet, at an estimated cost of $724,943.15.

The approximate location of the proposed channel is shown upon the accompanying map, but its exact position may be subject to some adjustment before the work of improvement actually commences. Such adjustment, however, will not, it is stated, materially affect the estimate of cost given above.

In the opinion of Colonel Allen, navigation interests at Richmond would be greatly facilitated if provision be made for a turning area in the harbor, about 400 feet wide by 600 feet long. Such an area could be obtained by enlarging the width of the proposed improved channel by 200 feet for a length of 600 feet, the depth to be equal to that contemplated for the extension of the improvement to the docks.

The cost of this enlargement would be in addition to the foregoing estimate, and would depend upon location. If made in the upper part of the harbor it would probably cost about $200,000, but if made below Jones Rock the probable cost would be $150,000.

Some occasional dredging to remove material brought down by freshets may be required after completion of the improvement.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

PRELIMINARY EXAMINATION OF JAMES RIVER, AT RICHMOND, VA., WITH A VIEW OF ASCERTAINING WHAT EXPENDITURE WILL BE NECESSARY TO CONTINUE THE IMPROVEMENT TO THE HEAD OF NAVIGATION AT THE DOCKS.

United States Engineer Office,
Washington, D. C., June 10, 1899.

General: I have the honor to submit the following report of a preliminary examination made this spring of James River, in accordance with the requirements of section 22 of the river and harbor act approved March 3, 1899. This section calls for an examination or survey as follows:

> James River: With a view of ascertaining what expenditure will be necessary to continue improvement to the head of navigation at the docks.

The "docks" are at the upper end of the harbor at Richmond, which is used by the largest vessels, and about 3,300 feet from the lower city limits.

James River is under improvement by the United States from the lower city limits of Richmond to the sea. An extended survey between Richmond and the mouth of the James was made in 1881 under the requirements of the river and harbor act of Congress of that year, and the report and estimate following that survey provided for a depth of 22 feet at mean low tide from the mouth of the river to Richmond, with channel widths as follows:

From the mouth (or sea) to City Point, 400 feet; thence to Drewry Bluff, 300 feet; thence to Richmond (lower city limit), 200 feet. The estimated cost of this project was given as $4,500,000. This project and its accompanying estimate were adopted by Congress in 1884. The amounts appropriated for improvement of James River, by acts July 11, 1870–March 3, 1899, sum up $1,922,000, of which the sum of $1,182,500 has been appropriated by acts July 5, 1884–March 3, 1899.

Before improvement commenced in 1870 the ruling depth from the sea to Richmond was 7 feet at mean low tide. The ruling depth is now 18 feet up to within a few hundred feet of the city limit, over which short distance some shoal points reduce the ruling depth to 16.5 feet.

Some small amount of work for improvement was done by the United States above the lower city limit prior to 1884, but it hardly cuts any figure in the reports. On page 1215, Appendix K, to the Annual Report of the Chief of Engineers for 1898, three lines at bottom of page, it is said that "The maintenance of the channel above the lower city line of Richmond has been under the direction of the James River improvement committee, and at the cost of the city."

Although the channel of the James has been improved so that vessels drawing 18 feet of water can ascend the river to within a few hundred feet from the lower city line, it must be said that there are important docks along the Richmond front above the improvement limits which can not be reached by vessels that can now navigate the 100 (round numbers) miles of river from the sea to the lower part of the city.

On page 191, Annual Report of the Chief of Engineers for 1898, is the following table of James River commercial statistics, 1890–1897:

	Tons.		Tons.
1890	743,122	1894	616,269
1891	739,308	1895	602,582
1892	616,755	1896	680,935
1893	663,625	1897	661,909

By reference to the commercial statistics at top of page 1213, Appendix K, Annual Report of 1898, it will be seen that of the total of 661,909 tons of shipments and receipts on James River in 1897, more than one-half pertained to the port of Richmond. Just what part of this latter pertained to the portion of the port above the lower city line is not given, but it is believed to be the larger part.

The mean low-tide depths in the harbor up to the docks range from about 17 feet to 11 feet, the latter being the ruling depth. Surveys of the harbor were made a number of years ago, but they did not, so far as our information goes, include borings of the rock bottom, and which are important in order that not only the extent of rock excavation necessary to an improvement (actual or projected) may be arrived at, but also in order that some estimate, though it would be at best approximate, may be made of the relative quantities of hard and soft rock that will have to be removed in case an adequate improvement of this reach should be undertaken.

As to whether the improvement should be carried to the head of navigation, or to the docks, by the United States, admits of discussion. Much may be said on both sides of the question. It seems to my mind, however, in view of the importance of this harbor, that it is worthy of improvement by the United States to the extent, at least, of providing an adequate channel up to the docks, and that the survey authorized by Congress in the act approved March 3, 1899, should be made, from which to arrive at the estimate of the cost of improvement.

The cost of making the full survey needed, involving soundings in which are included rock borings and necessary mapping, is here placed at $1,400.

Very respectfully, your obedient servant,

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of James River, Virginia (full text of item quoted within).

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 15, 1899.

Approved as recommended by the Acting Chief of Engineers.

By order of the Secretary of War.

JOHN C. SCOFIELD,
Chief Clerk.

SURVEY OF JAMES RIVER, AT RICHMOND, VA., WITH A VIEW OF ASCERTAINING WHAT EXPENDITURE WILL BE NECESSARY TO CONTINUE THE IMPROVEMENT TO THE HEAD OF NAVIGATION AT THE DOCKS.

UNITED STATES ENGINEER OFFICE,
Washington, D. C., December 9, 1899.

GENERAL: I have the honor to submit the following report upon a survey of James River, at Richmond, Va., made in accordance with the requirements of section 22 of the river and harbor act of Congress approved March 3, 1899. The paragraph in the said act under the heading "Virginia," authorizing the survey, reads as follows:

> James River: With a view of ascertaining what expenditure will be necessary to continue improvement to the head of navigation at the docks.

A plan and estimate of the cost of an improvement based upon the survey are embodied in this report.

The survey was made September–November last, under my direction, by Mr. S. H. Yonge, assistant engineer. A map from the survey is herewith. A report of preliminary examination in relation to this survey, and which is here respectfully referred to, was made by me under date of June 10, 1899, in which the location of the "docks" was given as at the upper end of the harbor of Richmond, and about 3,300 feet from the lower limits of that city.

The present project for improvement of James River, Virginia, is based upon the report of a survey of the river in 1881, made under the requirements of the river and harbor act of Congress of that year, and upon the report and estimate following that survey. The project was approved by the river and harbor act of Congress of July 5, 1884. This project provided for a depth of 22 feet at mean low tide from the mouth of James River to Richmond, with channel widths as follows:

From the mouth to City Point, 400 feet; thence to Drewry Bluff, 300 feet; thence to Richmond (lower city limit), 200 feet. This last-named width of 200 feet is assumed as the minimum needed for an extension of the improvement up to the docks.

The established harbor lines at Richmond are approximately shown in red on the accompanying map, and the proposed improvement for the harbor up to the docks is indicated by two parallel broken lines in black. The exact position for these latter lines may be subject to some slight adjustment before the work of improvement actually commences, but such adjustment will not materially affect the estimate of cost herein. The harbor lines were established in 1890. Please see the report dated March 17, 1890, of a Board of Officers of the Corps of Engineers upon the establishment of harbor lines from Mayo's bridge to Drewry Bluff, printed in Appendix I to the Annual Report of the Chief of Engineers for 1890, Part I, pages 1012–1019.

Estimated cost of continuing (extending) the improvement of James River, Virginia, to the head of navigation at the docks.—For the excavation of a channel to afford a free depth of 22 feet at mean low tide by a width of 200 feet between the lower city line of Richmond and the docks, a distance of about 3,300 feet:

Removal of 117,997 cubic yards of sand, gravel, cobblestones, and soft rock, at 25 cents per cubic yard	$29,499.25
Removal of 125,908 cubic yards of hard rock, at $5 per cubic yard	629,540.00
	659,039.25
Add for contingencies and engineering, 10 per cent	65,903.90
Total	724,943.15

The foregoing quantities are based upon the results of the survey of September–November, 1899, and are believed to be close approximations.

This report has not thus far estimated the cost of providing sufficient area of depth equal to that contemplated for the extension of the improvement to the docks to enable large seagoing vessels to turn about in the harbor; but unless such provision should be made the departure from Richmond of many large vessels might depend upon the aid of tugs to move them downstream to a point where they could turn. A turning area about 400 feet wide by 600 feet long would greatly facilitate the navigation. The area could be obtained by enlarging the width of the proposed improved channel by 200 feet for a length of 600 feet. The cost of such enlargement, and which would be in addition to the foregoing estimate, would depend upon location. If the enlargement were to be made in the upper part of the harbor, the cost would probably be about $200,000; if made below Jones Rock, the probable cost would be $150,000.

Some occasional dredging to remove material brought down by freshets may be required after completion of the improvement.

The commerce of James River from 1890 to 1898 (except 1893), inclusive, was as follows:

	Tons.		Tons.
1890	743,122	1895	602,582
1891	739,308	1896	680,935
1892	616,755	1897	661,909
1894	616,269	1898	472,778

Commercial statistics in detail for the calendar year 1898 are given in Appendix K of the Annual Report of the Chief of Engineers, United States Army, for 1899, page 1438.

I would respectfully invite attention to the accompanying report of Mr. S. H. Yonge, assistant engineer, upon the results of the survey from the lower city line to the docks.

Very respectfully, your obedient servant,

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

REPORT OF MR. SAML. H. YONGE, ASSISTANT ENGINEER.

UNITED STATES ENGINEER OFFICE,
Richmond, Va., December 4, 1899.

COLONEL: I have the honor to submit the following report on examination and survey of James River, Virginia, between the lower city line of Richmond and docks, and estimate of cost of extending the improvement to the docks based thereon, as provided by act of Congress approved March 3, 1899, with map of the reach and longitudinal section exhibiting results of borings and sketch of drill bit employed in boring. Fifty-three specimens from bore holes are forwarded separately.

The examination and survey consisted of making a plane-table survey of the shores and wharves of the reach, which has a length of 3,330 feet, sounding the entire area between mean low-water contours, probing into and, where possible, through the soft material overlying the rocky bed between the lines of proposed channel, and making borings extending below the bottom of the proposed channel on its central line.

The survey shows a few changes in wharf lines since the last survey in 1881, but none that has any particular bearing on the present project.

The soundings were made at 10 feet intervals on approximately normal ranges, 30 feet apart.

The probings were made with a ¾-inch steel rod, and over the lower 2,850 feet and upper 120 feet of the reach were spaced the same as the soundings, viz, 10 by 30 feet. For the remaining 360 feet they were spaced 30 by 30 feet.

The probings, as was subsequently ascertained in making the borings, did not reach the rocky bed except at a few points in the upper half of the reach, the progress of the probe being arrested by cobblestones, bowlders, or other resisting materials, which could not be penetrated. The value of the probings, therefore, in determining the depths of the upper bed of soft material is quite restricted. Twenty-five borings about 137½ feet apart were first made on the central line of the proposed channel. As the crest of the rocky bed developed by them above the middle of the reach proved to be very irregular, eight additional borings were made there.

The borings were made with an Ingersoll steam drill. The bit has five cutting edges on radial lines, between which are ⅜-inch cylindrical holes leading to the chamber, *b*. (See sketch[1] accompanying.)

As the bit screws into a hollow shaft, rock chippings, gravel, and other material penetrated pass into the shaft. When the bit is dull the materials are so finely comminuted as to make their exact character difficult to determine, although generally the specimens obtained furnish quite reliable information in that respect.

It was observed that when a boring failed to reach the required depth of 25 feet below mean low tide on account of the drill hole being choked by filling with sand, and other trials were made only a few feet distant, entirely different specimens were obtained. This occurred quite frequently in the upper half of the reach.

The same peculiarity appears on the longitudinal section, as in some cases there is no great uniformity of materials at contiguous bore holes.

It is noticeable on the section that the rocky bed nearly reaches to the bottom of the present channel between borings 4 and 13, after which it dips below the bottom of the proposed channel, then rising between borings 21 and 22, and again dipping at the lower end of the reach between borings 24 and 25. These undulations of the rocky bed and the variations in the specimens of materials from the drill suggest that on the reach under consideration the same conditions prevail as in the bed of the rapids extending several miles above the city, which is composed of extensive areas of granite rock and irregular fields of large granite bowlders, with the spaces between the latter filled with smaller bowlders of granite and trap rock, granite and sandstone cobbles, gravel, etc.

Your attention is called to the outcropping of rock, known as Jones Rock, opposite and between borings 5 and 6½, and corresponding to the adjacent elevated portion of the rocky bed developed by the borings.

PROJECT, QUANTITIES OF MATERIAL TO BE EXCAVATED, AND ESTIMATE OF COST.

In laying down the lines of the channel for the contemplated extension of the improvement to Richmond docks, an effort has been made, while following the natural bend of the left shore, to have as few changes of direction as possible. In making the estimate of cost, the width and depth of the proposed channel are taken as 200 feet and 22 feet, respectively, as provided in the approved project of 1884.

On account of the irregularity of the rocky bed and that of the distribution of the different materials, above referred to, it would be impossible to furnish a close estimate as to the quantities of different materials to be excavated, even though the bed of the proposed channel were explored by boring extensively over its entire area. Such an examination would be very costly, and probably would not give a much more correct estimate than that herewith submitted.

Estimate of cost and quantities of material to be removed in excavating a channel 200 feet wide and 22 feet deep below mean low tide in James River, Virginia, between the lower city line of Richmond and docks, a distance of 3,330 feet, based on an examination and survey made according to act of Congress approved March 3, 1899.

In preparing the estimate of quantities, side slopes of 1 on 1 were allowed for; also an additional depth of 1 foot to cover irregularities in blasting, etc.

117,997 cubic yards of sand, gravel, cobblestones, and soft rock, at $0.25	$29,499.25
125,908 cubic yards of hard rock, at $5	629,540.00
	659,039.25
Add for engineering and contingencies 10 per cent	65,903.90
Total	724,943.15

Respectfully submitted.

SAML. H. YONGE, *Assistant Engineer.*

Lieut. Col. CHAS. J. ALLEN,
Corps of Engineers, U. S. A.

---

[1] Not received.

L 20.

ESTABLISHMENT OF HARBOR LINES IN JAMES RIVER, AT RICHMOND, VIRGINIA.

OFFICE OF CITY ENGINEER, CITY HALL,
Richmond, Va., March 15, 1900.

DEAR SIR: We respectfully ask your attention to the location of a harbor line on the James River, which we believe should be and which we believe can be done without detriment to any public or private interests. The harbor line on north side of the river from Ship Lock to Shockoe Creek (see map[1]) runs close to a pier of the Richmond and Petersburg Connection Railroad. This pier we fear will prove an obstruction in floods and during the movement of ice on the falls, should the dike to be constructed by the city of Richmond be built on the present harbor line. We therefore ask your assent to building out so as to embrace this pier in our dike, thereby moving the harbor line a short distance into the river.

The accompanying map will show both the present harbor line and the one proposed. Your attention to this matter will be highly appreciated by our people.

Very respectfully,
W. E. CUTSHAW,
City Engineer.

Hon. ELIHU ROOT,
Secretary of War.

[Second indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
March 20, 1900.

Respectfully referred to Lieut. Col. Chas. J. Allen, Corps of Engineers, for report.

To be returned.

By command of Brigadier-General Wilson.

A. MACKENZIE,
Lieut. Col., Corps of Engineers.

[Third indorsement.]

U. S. ENGINEER OFFICE,
Washington, D. C., April 16, 1900.

Respectfully returned to the Chief of Engineers, United States Army.

There is no objection known to the change in wharf line as requested in the within letter from Mr. Cutshaw, city engineer of Richmond, Va.

The azimuth of the suggested line of change is, as determined by Mr. S. H. Yonge, our assistant engineer at Richmond, S. 54° 26′ 05″ E., or very nearly so, and the length of line 3,629 feet, as shown on the tracing herewith. Mr. Yonge suggests that, instead of stopping the change in the wharf line at the southwest corner of the bridge pier, as shown on the blue print accompanying the request of the city engineer, the proposed new line be continued for about 523.7 feet (the azimuth of the line for this distance to be S. 64° 09′ 50″ E.) to the angle in the retaining wall, just below Mayo Bridge, as also shown on the tracing. This is to avoid a reentering at the mouth of Shockoe Creek, the creek, of course, to have free discharge into the river. I concur in this suggestion, and recommend that the change in harbor line asked for by the city engineer be allowed, and that the proposed change in the line above the bridge pier be authorized, the recommended changes being shown in full red lines on the tracing herewith.

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[1] Not printed.

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers.

[Fourth indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
April 21, 1900.

Respectfully returned to the Secretary of War.

Mr. W. E. Cutshaw, city engineer, Richmond Va., requests a modification of the harbor line on the north side of James River between Ship Lock and Shockoe Creek.

The matter has been considered by the local engineer officer, Lieutenant-Colonel Allen, whose report is contained in the preceding (third) indorsement, to which attention is respectfully invited. It is recommended that the line be modified as proposed by Lieutenant-Colonel Allen and indicated on the accompanying tracing, and that the Secretary also place his approval upon said tracing which has been prepared for his signature.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[Fifth indorsement.]

WAR DEPARTMENT,
April 23, 1900.

Approved as recommended by the Chief of Engineers.

ELIHU ROOT,
Secretary of War.

APPENDIX M.

IMPROVEMENT OF NORFOLK HARBOR, VIRGINIA, AND ITS APPROACHES, AND OF RIVERS AND HARBORS IN SOUTHEASTERN VIRGINIA AND NORTHEASTERN NORTH CAROLINA.

REPORT OF MAJ. JAMES B. QUINN, CORPS OF ENGINEERS, OFFICER IN CHARGE, FOR THE FISCAL YEAR ENDING JUNE 30, 1900, WITH OTHER DOCUMENTS RELATING TO THE WORKS.

IMPROVEMENTS.

1. Harbor at Norfolk and its approaches, Virginia.
2. Western Branch of Elizabeth River, Virginia.
3. Nansemond River, Virginia.
4. Appomattox River, Virginia.
5. Harbor at Cape Charles City, Virginia.
6. Nandua Creek, Virginia.
7. Waterway from Norfolk, Virginia, to the sounds of North Carolina.
8. Inland water route from Norfolk, Virginia, to Albemarle Sound, North Carolina.
9. Edenton Bay, North Carolina.
10. Roanoke River, North Carolina.
11. Removing sunken vessels or craft obstructing or endangering navigation.

EXAMINATION AND SURVEY.

12. Middle Ground Bar, harbor of Hampton Roads, Virginia.

HARBOR LINES.

13. Elizabeth River, at Norfolk, Virginia.

United States Engineer Office,
Norfolk, Va., July 18, 1900.

General: I have the honor to transmit herewith my annual report upon the works of river and harbor improvement in my charge during the fiscal year ended June 30, 1900.

Very respectfully, your obedient servant,

James B. Quinn,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.

M 1.

IMPROVEMENT OF HARBOR AT NORFOLK AND ITS APPROACHES, VIRGINIA.

No work was carried on during the fiscal year ended June 30, 1900. The expenditures during the fiscal year were for office expenses in posting maps of the improvement to date, and for examination of channel at intervals to determine its condition.

The commerce of the harbor for the calendar year 1899 is shown in tabulated form below.

Norfolk Harbor is in the collection district of Norfolk and Portsmouth, and Norfolk, Va., is the nearest port of entry. Nearest light-house is Craney Island light, at mouth of Elizabeth River, Virginia. Nearest fort, Fort Monroe, Va.

Amount of revenue collected at port of Norfolk, Va., during the fiscal year ended June 30, 1900, $25,135.42.

Money statement.

July 1, 1899, balance unexpended	$3,663.52
June 30, 1900, amount expended during fiscal year	62.50
July 1, 1900, balance unexpended	3,601.02
Amount (estimated) required for completion of existing project	56,774.56
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	56,774.56

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

Improving harbor at Norfolk, Va.:	
August 14, 1876	$35,000.00
June 18, 1878	50,000.00
March 3, 1879	75,000.00
June 14, 1880	50,000.00
March 3, 1881	75,000.00
August 2, 1882	75,000.00
July 5, 1884	25,000.00
August 5, 1886	50,000.00
August 11, 1888	50,000.00
September 19, 1890	150,000.00
July 13, 1892	150,000.00
August 18, 1894	100,000.00
June 3, 1896	100,000.00
Improving Elizabeth River, Virginia:	
July 7, 1898	360,000.00
Total	1,345,000.00
Amount turned in to surplus fund of the Treasury from appropriation of July 7, 1898	483.58
Aggregate	1,344,516.42

COMMERCIAL STATISTICS.

The following statistics relative to the commerce of the harbor at Norfolk, Va., during the calendar year 1899, were compiled from statements furnished by parties making shipments over this waterway:

Articles.	Amount.	Value.
	Tons.	
Coal	2,221,892	$5,199,590
Coke	34,051	102,153
Iron ore	3,300	33,000
Lumber	361,215	5,605,132
Logs	190,500	1,005,000
Fertilizers	50,500	750,000
Ice	10,153	11,441
Bricks	34,000	58,000
Merchandise	3,354,673	370,263,882
Total	6,260,284	383,028,198

No accurate statement can be compiled as to the number, draft, and tonnage of vessels navigating the harbor, but it may be said that they were from a very small to a 9,000-ton ship.

Approximate amount of freight of all kinds shipped and received by water.

	Tons.		Tons.
1888	1,914,506	1894	4,545,049
1889	2,243,087	1895	5,013,185
1890	2,384,841	1896	5,986,636
1891	2,931,751	1897	9,430,526
1892	3,427,189	1898	6,510,201
1893	3,584,727	1899	6,260,284

M 2.

IMPROVEMENT OF WESTERN BRANCH OF ELIZABETH RIVER, VIRGINIA.

No operations were carried on during the fiscal year except that of making an examination of the channel dredged in 1897, for which the expenditures amounted to $207.50.

This river is in the collection district of Norfolk and Portsmouth, Va., and Norfolk, Va., is the nearest port of entry. Nearest light-house, Craney Island Light, at the mouth of Elizabeth River, Virginia. Nearest fort, Fort Monroe, Va.

The amount of revenue collected at the port or Norfolk, Va., during the fiscal year ending June 30, 1900, is $25,135.42.

Money statement.

July 1, 1899, balance unexpended	$581.27
June 30, 1900, amount expended during fiscal year	207.50
July 1, 1900, balance unexpended	373.77

APPROPRIATION.

June 3, 1896	$45,000

COMMERCIAL STATISTICS.

It is reported that 576,898 tons of freight was transported on the river during the calendar year 1899. Other details could not be obtained. The terminal of the Atlantic and Danville Railway was removed from this river during the fiscal year and all the business done by that company is now carried on from Pinner Point, Norfolk Harbor.

Approximate amount of freight of all kinds shipped and received by water.

	Tons.		Tons.
1896	211,653	1898	346,835
1897	244,803	1899	576,898

M 3.

IMPROVEMENT OF NANSEMOND RIVER, VIRGINIA.

The only work on this improvement in the fiscal year 1900 was the removal of a tree which obstructed navigation about 4 miles below Suffolk, Va. The snag boat *Roanoke* removed the obstruction at a cost of $31.67.

A complaint stating that several parties were planting oysters in the channel of the river, thus interfering with navigation, was investigated and found to be groundless.

Nansemond River is in the collection district of Norfolk and Portsmouth, and Norfolk, Va., is the nearest port of entry. Nearest light-house, Pig Point Light, at mouth of river. Nearest fort, Fort Monroe, Va.

The amount of revenue collected at the port of Norfolk, Va., during the fiscal year ended June 30, 1900, is $25,135.42.

Money statement.

July 1, 1899, balance unexpended	$9,904.63
June 30, 1900, amount expended during fiscal year	31.67
July 1, 1900, balance unexpended	9,872.96
Amount (estimated) required for completion of existing project	102,500.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	20,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.	

APPROPRIATIONS.

March 3, 1873	$15,000	July 13, 1892	$10,000
March 23, 1874	10,000	August 18, 1894	10,000
March 3, 1875	5,000	June 3, 1896	5,000
March 14, 1876	5,000	March 3, 1899	5,000
June 18, 1878	2,000		
August 11, 1888	10,000	Total	87,000
September 19, 1890	10,000		

COMMERCIAL STATISTICS.

No replies were received to inquiries sent out in regard to the commerce of this river during the calendar year 1899.

Approximate amount of freight of all kinds shipped and received by water.

	Tons.		Tons.
1888	109,900	1894	53,762
1890	217,738	1895	59,701
1891	78,572	1896	61,405
1892	133,723	1897	43,500
1893	59,473	1898	31,796

M 4.

IMPROVEMENT OF APPOMATTOX RIVER, VIRGINIA.

Dredging in progress at the close of the fiscal year 1899 was continued on the river until October 30, 1899, when operations ceased, sufficient funds being reserved to enable slight repairs to be made to the Closure Dike.

The amount dredged during the fiscal year was 22,900 cubic yards, scow measurement, removed at localities as follows: 7,200 cubic yards in dredging in the vicinity of Rushmores Dike, over a width of 40 feet for a distance of 650 feet, the material being disposed of by being wheeled ashore and used to close the old channel, the fill extending to 4 feet above mean high water; 12,550 cubic yards in dredging at Sunken Island over a width of 40 feet for a distance of 300 feet and over a width of 20 feet for a farther distance of 1,000 feet; 3,150 cubic yards in dredging at Mills Bar over a width of 40 feet for a distance of 100 feet and 20 feet for an additional 450 feet. The dredged material in the last two instances was disposed of as follows: That dredged at Sunken Island was wheeled ashore on the west and east sides of the entrance to the old channel, and the material removed at Mills Bar was wheeled ashore between timber jetties Nos. 17 and 18. The depth obtained was 11 feet at mean high water. The character of the material removed at Rushmores Dike was clay, mud, and sand; that removed at Sunken Island mud and sand, and that at Mills Bar mostly sand.

The plant used and methods employed in doing the work are described on page 1477 of the Annual Report of the Chief of Engineers for 1899. The cost of the work done in the present fiscal year was about 24 cents per cubic yard, scow measurement, dredged and wheeled ashore, of which the cost of the excavation on scows at points where the material was wheeled ashore was about 14.4 cents, and the cost of putting ashore 9.6 cents. This latter price is slightly in excess of the cost of disposing of the material dredged in the fiscal year 1899, due to the greater quantity of clay and mud encountered, which materials are not so readily shoveled from scows into wheelbarrows. The cost of dredging is likewise slightly more than that of the previous year. After dredging was discontinued a tug and master laborer were employed in repairing the Closure Dike by filling in material behind it to reenforce it, the city of Petersburg furnishing the material and the necessary labor to wheel it ashore. The cost of the repairs was $293.45, and the material deposited behind the dike amounted to 5,000 cubic yards, scow measurement.

The expenditures during the fiscal year 1900 aggregated $7,208.73. The expenditures were made from the appropriations made in the acts of June 3, 1896, and March 3, 1899. For the latter a project was submitted, under date of August 29, 1899, which was approved August 31, 1899, providing for the expenditure of the funds appropriated therein in dredging at Sunken Island, Mills Bar, and Magazine Bend. Owing to the funds being exhausted in doing the dredging required at the other two points, no work could be done at the locality last named.

This river is in the collection district of Petersburg, Va., which is the nearest port of entry; nearest light-house, Jordan Point Light, in the James River, Virginia; nearest fort, Fort Monroe, Va.

The amount of revenue collected at the port of Petersburg, Va., during the fiscal year ended June 30, 1900, is $2,173.58.

Money statement.

July 1, 1899, balance unexpended	$7,242.04
June 30, 1900, amount expended during fiscal year	7,208.73
July 1, 1900, balance unexpended	33.31
Amount (estimated) required for completion of existing project	48,090.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, for maintenance of improvement under existing project in addition to the balance available July 1, 1900	10,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

March 3, 1871	$50,000	July 5, 1884	$25,000
June 10, 1872	40,000	August 5, 1886	18,750
March 3, 1873	30,000	August 11, 1888	15,000
June 23, 1874	30,000	September 19, 1890	15,000
March 3, 1875	30,000	July 13, 1892	15,080
August 14, 1876	30,000	August 18, 1894	5,000
June 18, 1878	30,000	June 3, 1896	5,000
March 3, 1879	20,000	March 3, 1899	5,000
June 14, 1880	20,000		
March 3, 1881	20,000	Total	438,830
August 2, 1882	35,000		

COMMERCIAL STATISTICS.

The following statistics relative to the commerce of the Appomattox River, Virginia, during the calendar year 1899 were furnished by Mr. W. N. Mays, harbor master, Petersburg, Va.:

Articles.	Amount.	Value.
Coal .... tons..	4,592	$25,255
Peanuts .... bags..	21,956	108,120
Fertilizer .... tons..	6,852	70,820
Merchandise	....	235,931
Lumber .... feet..	28,119,000	267,111
Railroad ties .... number..	6,000	3,000
Total	....	710,237

Vessels.	Number.	Average draft.
		Feet.
Steam	1,063	8
Sail	331	9
Barges	126	9
Total	1,520	....

Approximate amount of freight of all kinds received and shipped by water.

	Tons.		Tons.
1888	30,626	1892	25,218
1889	26,121	1896	81,318
1890	21,693	1897	84,031
1891	26,275	1898	95,941

Number of tons for year 1899 could not be obtained. Commerce was valued at $710,237.

M 5.

IMPROVEMENT OF HARBOR AT CAPE CHARLES CITY, VIRGINIA.

In accordance with the approved project for the expenditure of the appropriation for this work in the act of March 3, 1899, amounting to $20,000, proposals for the material and labor required to complete the north jetty and to construct such portion of the south jetty as the available funds would permit, were solicited by newspaper advertisement under date of July 19, 1899. An abstract of the bids received in response thereto, which were opened on August 22, 1899, is appended.

Instructions were received from the Department on September 22, 1899, directing the award of the contract to Charles W. Johnston, of Lewes, Del., the bid of J. Luther Kountze, of Boston, Mass., being considered too low and his proposal informal, no guaranty accompanying the paper and only a single copy of the proposal being received. The contract with Mr. Johnston was executed under date of October 7, 1899, and approved by the Chief of Engineers, United States Army, October 25, 1899, work to be commenced thereunder fifteen days after receipt of notification of approval and to be completed within five months, including Sundays and legal holidays.

The contractor began work December 1, 1899, but as the winter season was well advanced he only continued operations until January 15, 1900. During this time he drove the guide piles for the north jetty, cut the brush, constructed and sunk the mattress, and placed 1,007 tons of stone weighing 25 to 300 pounds. The latter was distributed over the entire distance of the new portion of the jetty, which is 425 feet long.

On March 21, 1900, the Chief of Engineers extended the time for the completion of the contract three and one-half months, or to July 15, 1900. The contractor resumed operations May 12, 1900, and to the close of the year had placed 1,991 tons of stone weighing 500 to 1,500 pounds and 1,150 tons of stone weighing 25 to 300 pounds, distributing the same over the entire distance of 425 feet of the new part of the jetty, completing the jetty to its projected length, except for a distance of about 125 feet at the outer end. The jetty when completed will be 1,625 feet in length and 3 feet above mean high water.

During June, 1900, the contractor commenced work on the south jetty and at the close of the fiscal year had placed all the brush along the line of the jetty for a distance of 126 feet. Sufficient stone had been distributed over 41 feet from the inshore end to complete that portion, and for a further distance of 50 feet stone had been placed to 3 feet above mean low water. For the balance of the distance just enough stone had been deposited on the brush to keep it in place. This work required 199⅝ cubic yards of brush and 195 tons of stone.

Cape Charles City Harbor is in the collection district of Cherrystone, Va., and Cape Charles City, Va., is the nearest port of entry. Fort Monroe, Va., is the nearest fort, and the nearest light-house is Cherrystone Light.

No revenue was collected at the port of Cape Charles City, Va., during the fiscal year ended June 30, 1900.

Money statement.

July 1, 1899, balance unexpended		$20,017.54
June 30, 1900, amount expended during fiscal year		10,420.35
July 1, 1900, balance unexpended		9,597.19
July 1, 1900, outstanding liabilities	$5,224.58	
July 1, 1900, amount covered by uncompleted contracts	3,824.96	
		9,049.54
July 1, 1900, balance available		547.65
Amount (estimated) required for completion of existing project		87,340.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		40,000.00
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.		

APPROPRIATIONS.

September 19, 1890	$25,000
July 13, 1892	10,000
March 3, 1899	20,000
Total	55,000

Abstract of proposals for constructing jetties in harbor of Cape Charles City, Va., received in response to advertisement, dated July 19, 1899, and under specifications of the same date, opened by Maj. Thomas L. Casey, Corps of Engineers, at Norfolk, Va., on August 22, 1899, at 12 o'clock.

No. of proposal.	Name and address of bidder.	Brush mattress.			Stone weighing 25 to 300 pounds.		
		Approximate quantity.	Price bid per cubic yard.	Amount.	Approximate quantity.	Price bid per 2,000-pound ton.	Amount.
		Cu. yds.			*Tons.*		
[a]1	J. Luther Kountze, Boston, Mass	2,850	$0.25	$712.50	4,500	$1.00	$4,500.00
2	Frank Pidgeon, New York, N. Y	2,850	1.90	5,415.00	4,500	2.50	11,250.00
[b]3	Charles W. Johnston, Lewes, Del	2,850	1.49	4,246.50	4,500	2.50	11,250.00
[c]4	David V. Howell, New York, N. Y	2,850	1.34	3,819.00	4,500	2.38	10,710.00
5	Duke & Smith, Norfolk, Va	2,850	1.99	5,671.50	4,500	2.64	11,880.00

No. of proposal.	Name and address of bidder.	Stone weighing 500 to 1,500 pounds.			Brush in place of mat for shore end of south jetty.			Aggregate.
		Approximate quantity.	Price bid per 2,000-pound ton.	Amount.	Approximate quantity.	Price bid per cubic yard.	Amount.	
		Cu. yds.			*Tons.*			
[a]1	J. Luther Kountze, Boston, Mass	9,000	$1.25	$11,250.00	1,000	$0.50	$500.00	$16,962.50
2	Frank Pidgeon, New York, N. Y	9,000	2.80	25,200.00	1,000	1.80	1,800.00	43,665.00
[b]3	Charles W. Johnston, Lewes, Del	9,000	2.50	22,500.00	1,000	1.25	1,250.00	39,246.50
[c]4	David V. Howell, New York, N. Y	9,000	2.68	24,120.00	1,000	.68	680.00	39,329.00
5	Duke & Smith, Norfolk, Va	9,000	2.96	26,640.00	1,000	1.76	1,760.00	45,951.50

[a] Only one copy of proposal received; guaranty not executed.
[b] Bid recommended for acceptance.
[c] Name of bidder omitted in one of the spaces of guaranty.

ABSTRACT OF CONTRACT IN FORCE.

Name and address of contractor: Charles W. Johnston, Lewes, Del.
Date of approval, October 25, 1899.
Date of beginning work, December 1, 1899.
Date of expiration, August 15, 1900.

COMMERCIAL STATISTICS.

The commerce of the harbor is reported to have amounted to 591,298 tons during the calendar year 1899. It was impossible to obtain any other details except as given in the letter below from Mr. J. G. Rodgers, superintendent of the New York, Philadelphia and Norfolk Railroad Company.

NEW YORK, PHILADELPHIA AND NORFOLK RAILROAD CO.,
SUPERINTENDENT'S OFFICE,
Cape Charles City, Va., May 31, 1900.

DEAR SIR: Noting your letter of recent date with reference to statement of shipments and receipts from Cape Charles City for year ending December 31, 1899, I beg to inclose herewith statement showing the number of steamers, barges, lighters, and tugs owned by this company, and the average draft and tonnage of same.

We have also included in this statement the total tonnage handled at this port.

In addition to the information embraced in this statement, I beg to advise you that we have trading at this port, handling all classes of freight, such as fish, oysters, lumber, etc., some 200 to 300 sailing vessels with a draft of from 1 to 6 feet.

There are also trading at this port some half a dozen three-masted schooners from the east with ice, whose average draft of water is about 13 feet.

In addition to the above, there are some 14 fishing steamers who use our harbor for the purpose of securing stores, coal, etc., and also as a harbor during stress of weather, while the light-house and buoy tenders of the Government are frequent visitors at this port.

If there is any additional information I can give you, and you will advise me, I will be glad to furnish the same.

Yours, truly,

J. G. Rodgers, *Superintendent.*

Maj. James B. Quinn,
Corps of Engineers, U. S. A.

Statement of shipments and receipts.

Vessels.	Number.	Average draft.	Average tonnage.
		Ft. in.	
Steamers	3	9 2	927
Barges	5	7 2	1,065
Lighters	2	2 8	327
Tugs	4	10 0	202

Approximate amount of freight of all kinds shipped and received by water.

	Tons.		Tons.
1890	390,207	1895	455,269
1891	319,164	1896	487,004
1892	341,269	1898	569,894
1893	393,352	1899	591,298
1894	427,723		

M 6.

IMPROVEMENT OF NANDUA CREEK, VIRGINIA.

The work of dredging the channel through the bar at the mouth of this creek was advertised under date July 25, 1899. An abstract of the proposals received in response to the advertisement is appended. The contract was awarded to James Caler, of Norfolk, Va., the lowest bidder, and the contract executed with him bears date of September 25, 1899.

Mr. Caler sent his plant, consisting of dredge, two scows, and tugboat, to the creek early in November, 1899. Work was started November 13, 1899, and operations continued until December 31, 1899, when the plant was withdrawn from the work on account of the severe winter weather, for which cause operations were suspended under the authority of the Chief of Engineers, United States Army, until early spring. The contractor had only removed 4,335 cubic yards, scow measurement, of material on December 31, 1899.

The same plant resumed work on March 1, 1900, and during that month removed 1,970 cubic yards of material. To the 10th of April, 1900, 958 cubic yards had been removed, and as the contractor was losing money, he threatened to abandon his contract; but after securing an extension of three months' time from May 30, 1900, in which to complete the balance of the work, he agreed to make another effort to finish, and on the 1st of June, 1900, put a smaller-sized dredge and scows than he had heretofore employed on the work, which removed, to the close of the fiscal year, 3,687 cubic yards, scow measurement, of material, making a total of 10,950 cubic yards under the contract and resulting in a channel of a least width of 50 feet and 8 feet deep at mean low water for a distance of 1,000 feet. The material removed was sand.

Another difficulty which the contractor had to contend with, in addition to delays on account of bad weather, was that in making the first cut in water not over 2 feet in depth at mean low water the material had to be thrown over to one side, in order to give room for scows to be loaded alongside the dredge. This occupied about one-fourth of the time of the dredge, and the contractor was not paid for the material so removed.

Nandua Creek is in the collection district of Cherrystone, Va., and Cape Charles City, Va., is the nearest port of entry. Fort Monroe, Va., is the nearest fort and the nearest light-house is Cherrystone Light.

No revenue was collected at the port of Cape Charles City, Va., during the fiscal year ended June 30, 1900.

Money statement.

July 1, 1899, balance unexpended		$5,988.08
June 30, 1900, amount expended during fiscal year		2,324.60
July 1, 1900, balance unexpended		3,663.48
July 1, 1900, outstanding liabilities	$989.94	
July 1, 1900, amount covered by uncompleted contracts	2,592.43	
		3,582.37
July 1, 1900, balance available		81.11

APPROPRIATIONS.

June 3, 1896	$3,000
March 3, 1899	3,000
Total	6,000

Abstract of proposals for dredging in Nandua Creek, Virginia, received in response to advertisement dated July 25, 1899, and under specifications of the same date, opened by Maj. Thomas L. Casey, Corps of Engineers, at Norfolk, Va., on August 29, 1899, at 12 o'clock.

No. of proposal.	Name and address of the bidder.	Price bid per cubic yard, scow measurement.	Amount available for dredging.	Amount of material that can be removed with available funds.
		Cents.		*Cubic yds.*
1	James Caler, Norfolk, Va. *a*	*b* 27	$5,500	20,370
2	Fred. E. Jones, Norfolk, Va.	29	5,500	18,487

a Names of guarantors omitted in guaranty. Certificate as to guarantors made by deputy collector of customs. Bid received in duplicate.

b Lowest bid; recommended for acceptance.

COMMERCIAL STATISTICS.

The following statistics relative to the commerce of Nandua Creek, Virginia, during the calendar year 1899, were furnished by Mr. J. C. Boggs, of Nandua, Va.

Articles.	Amount.	Value.
	Tons.	
Merchandise and truck	6,500	$150,000
Oysters	1,000	10,000
Total	7,500	160,000

Vessels.	Number.	Average draft.	Average tonnage.
		Feet.	
Steam	2	6½	450
Sail	10	6	30
Total	12		

Approximate amount of freight of all kinds shipped and received by water.

	Tons.		Tons.
1896	6,125	1898	8,550
1897	3,436	1899	7,500

M 7.

IMPROVEMENT OF WATERWAY FROM NORFOLK, VIRGINIA, TO THE SOUNDS OF NORTH CAROLINA.

The proposals received in response to newspaper advertisement of June 19, 1899, for the different work required to complete the improvement contemplated under the adopted project were opened July 21, 1899. An abstract of the proposals is appended.

The award of the contract was authorized to be made to the lowest bidder, the Virginia Dredging Company, of Richmond, Va., and on August 1, 1899, that corporation entered into contract to do the work, the same to be completed on or before January 1, 1902. The estimated cost of the whole improvement, at the prices stipulated in the contract, is $224,200, which, with 10 per centum for contingencies, would make the total estimated cost $246,620.

The sum of $200,000 was appropriated in the sundry civil bill for continuing the improvement, and on June 15, 1900, a project for the expenditure of that amount was submitted, providing for paying the contractor $27,033.34 for work done which had not been paid for, and in continuing the dredging in Deep Creek, Turners Cut, including bank protection where necessary, and removing Shipyard Bar and projecting points in the Pasquotank River, North Carolina, as required by the adopted project. The project was approved June 23, 1900.

During the fiscal year the contractor carried on operations in dredging Deep Creek, Turners Cut, and in removing two points in the Pasquotank River, North Carolina.

Work on Deep Creek was commenced on September 11, 1899, and continued until February 21, 1900, a total of 199,364 cubic yards, scow measurement, of material being removed in dredging from the mouth of the creek at its junction with the Southern Branch of the Elizabeth

River, Virginia, a distance of 10,400 feet, to a depth of 10 feet at mean low water. The width of the channel dredged was 45 feet for 8,700 feet of the distance, 60 feet for 200 feet, and 90 feet for 1,500 feet. The material removed was sand and mud, with some clay.

Trouble has been experienced on this section of the work in securing the projected depth, as the sides of the cut cave in and cause it to fill up rapidly, and in order to overcome this to some extent it was necessary to dredge to 15 or 16 feet below mean low water, and the inspectors have reported in some instances where dredging had been carried to that depth that when the dredge had been moved ahead her length the cut had filled in to 10 feet. On account of this rapid fill the removal of 50,000 cubic yards of material over the amount estimated for this section will probably be necessary to provide a channel of the projected dimensions. This, at the present contract price, will cost $7,500, or, with contingencies added, $8,250.

In Turners Cut and the Pasquotank River two hydraulic dredges were employed during part of January, all of February, and part of March, 1900. At the former dredging was confined to the removal of shoal spots, and the point at the entrance of the cut into the Pasquotank River was partially removed to give immediate relief to traffic. The total number of cubic yards removed on this section was 48,843, place measurement.

The work in the Pasquotank River consisted of the removal of the first point in the river below the mouth of Turners Cut and the partial removal of the point opposite Sawyers Ferry. The total yardage of this work was 8,217 cubic yards, place measurement.

In the latter part of June, 1900, the contractor resumed work in Turners Cut, one small hydraulic dredge being placed at work. No measurement of the work done since this dredge has been at work has been made.

Besides the appropriations heretofore made it is estimated that the sum of $29,870 will be required to complete the work, which will make the cost of the whole improvement, including contingencies, $254,870. This increase is accounted for by the extra dredging needed to secure the proper channel depth in Deep Creek. The total cost of the work as given in the adopted project was $274,310.

The amount estimated as required for the fiscal year 1902 will either be due the contractor for work already performed or to be executed early in that fiscal year, as the contract for the work will expire by limitation on January 1, 1902. It will be applied at the following localities:

Removing 90,000 cubic yards, place measurement, of material in Turners Cut, at 25 cents	$22,500
Dredging shoal off Croatan Light, 15,000 cubic yards, scow measurement, of material, at 30 cents	4,500
Contingencies, inspection, etc., about 10 per cent	2,800
Total amount required	29,870

The Dismal Swamp Canal, of which Deep Creek forms the north approach and Turners Cut the approach from the south, was opened for traffic on September 1, 1899. The statement appended shows the business of the canal from date of opening to and including December 31, 1899.

This work is in the collection district of Norfolk and Portsmouth, Va., and Albemarle, N. C.; and Norfolk, Va., and Edenton, N. C., are the nearest ports of entry. The nearest light-houses are Wade Point Light, in Albemarle Sound; Croatan Light, in Croatan Sound, North Carolina, and Craney Island Light, in Elizabeth River, Virginia. Fort Monroe, Va., is the nearest fort.

The amount of revenue collected at the port of Norfolk, Va., during the fiscal year ended June 30, 1900, is $25,135.42.

Money statement.

July 1, 1899, balance unexpended		$25,000.00
Amount appropriated by sundry civil act approved June 6, 1900		200,000.00
		225,000.00
June 30, 1900, amount expended during fiscal year		22,281.07
July 1, 1900, balance unexpended		202,718.93
July 1, 1900, outstanding liabilities	$24,515.87	
July 1, 1900, amount covered by uncompleted contracts	183,991.19	
		208,507.06
Amount (estimated) required for completion of existing project		49,310.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900		29,870.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

March 3, 1899	$25,000
Act June 6, 1900	200,000
Total	225,000

Abstract of proposals for dredging and bank protection in waterway from Norfolk, Va., to the sounds of North Carolina, received in response to advertisement dated June 19, 1899, and under specifications of the same date, opened by Maj. Thos. L. Casey, Corps of Engineers, at Norfolk, Va., on July 21, 1899, at 12 o'clock.

SECTION 1.—DEEP CREEK, VIRGINIA.

No. of proposal.	Name and address of bidder.	A			B	
		Approximate quantity of material.	Price bid per cubic yard for material removed and towed to dump.	Aggregate of bid.	Price bid per cubic yard for material removed and placed on shore.	Aggregate of bid.
		Cu. yds.				
1	P. Sanford Ross, Jersey City, N. J.	250,000	$0.19	$47,500.00	$0.19	$47,500.00
2	Virginia Dredging Co., Richmond, Va.	250,000	.15	37,500.00		
3	Sanford & Brooks, Baltimore, Md	250,000	.14	35,000.00	.14	35,000.00
4	Morris & Cummings Dredging Co., New York, N. Y.	250,000	.20	50,000.00	.21	52,500.00

Abstract of proposals for dredging and bank protection in waterway from Norfolk, Va., to the sounds of North Carolina, etc.—Continued.

SECTION 2.—TURNERS CUT, NORTH CAROLINA.

No. of proposal.	Name and address of bidder.	Approximate quantity of material.	Price bid per cubic yard for material removed and placed on shore.	Aggregate of bid.
		Cubic yards.		
1	P. Sanford Ross, Jersey City, N. J	450,000	$0.37	$166,500.00
2	Virginia Dredging Co., Richmond, Va	450,000	.25	112,500.00
3	Sanford & Brooks, Baltimore, Md	450,000	.30	135,000.00
4	Morris & Cummings Dredging Co., New York, N. Y	450,000	.35	157,000.00

SECTION 3.—PASQUOTANK RIVER, NORTH CAROLINA.

No. of proposal.	Name and address of bidder.	Shipyard bar.			Projecting points.			Total for section.
		Aproximate quantity of material.	Price bid per cubic yard for material removed and deposited.	Aggregate of bid.	Approximate quantity of material.	Price bid per cubic yard for material removed.	Aggregate of bid.	
		Cu. yds.			*Cu. yds.*			
1	P. Sanford Ross, Jersey City, N. J	30,000	$0.19	$5,700.00	60,000	$0.37	$22,200.00	$27,900.00
2	Virginia Dredging Co., Richmond, Va.	30,000	.15	4,500.00	60,000	.27	16,200.00	20,700.00
3	Sanford & Brooks, Baltimore, Md	30,000	.18	5,400.00	60,000	.28	16,800.00	22,200.00
4	Morris & Cummings Dredging Co., New York, N. Y	30,000	.20	6,000.00	60,000	.35	21,000.00	27,000.00

SECTION 4.—CROATAN SOUND, NORTH CAROLINA.

No. of proposal.	Name and address of bidder.	Approximate quantity of material.	Price bid per cubic yard for material removed and deposited.	Aggregate of bid.	Total for dredging, including—	
					A	B
					Of section 1.	Of section 1.
		Cu.yds.				
1	P. Sanford Ross, Jersey City, N. J	15,000	$0.36	$5,400.00	$247,300.00	$247,300.00
2	Virginia Dredging Co., Richmond, Va	15,000	.30	4,500.00	175,200.00	....
3	Sanford & Brooks, Baltimore, Md	15,000	.28	4,200.00	196,400.00	196,400.00
4	Morris & Cummings Dredging Co., New York, N. Y	15,000	.35	5,250,00	239,750.00	242,250.00

SECTION 5.—BANK PROTECTION.

No. of proposal.	Name and address of bidder.	Timber protection.			Brush protection.			Total for bank protection.
		Approximate quantity, not stated in specifications, rough estimate.	Price bid per linear foot.	Aggregate of bid.	Approximate quantity, not stated in specifications, rough estimate.	Price bid per linear foot.	Aggregate of bid.	
		Lin. ft.			*Lin. ft.*			
1	P. Sanford Ross, Jersey City, N. J	14,000	$3.75	$52,500.00	14,000	$1.25	$17,500.00	$70,000.00
2	Virginia Dredging Co., Richmond, Va.	14,000	2.00	28,000.00	14,000	1.50	21,000.00	49,000.00
3	Sanford & Brooks, Baltimore, Md	14,000	1.93	27,020.00	14,000	1.00	14,000.00	41,020.00
4	Morris & Cummings Dredging Co., New York, N. Y	14,000	3.50	49,000.00	14,000	1.10	15,400.00	64,400.00

Abstract of proposals for dredging and bank protection in waterway from Norfolk, Va., to the sounds of North Carolina, etc.—Continued.

RECAPITULATION.

No. of proposal.	Name and address of bidder.	Total for both classes of work, including A of section 1.
1	P. Sanford Ross, Jersey City, N. J	$317,300
2	Virginia Dredging Co., Richmond, Va	*a* 224,200
3	Sanford & Brooks, Baltimore, Md	237,420
4	Morris & Cummings Dredging Co., New York, N. Y	304,150

a Lowest bid recommended for acceptance.

ABSTRACT OF CONTRACT IN FORCE.

Name of contractor: Virginia Dredging Company.
Date of approval: September 6, 1899.
Date of beginning work: September 11, 1899.
Date of expiration: January 1, 1902.

COMMERCIAL STATISTICS.

The following statistics were furnished by Mr. W. B. Brooks, jr., president of the Lake Drummond Canal and Water Company, and show the traffic through the Dismal Swamp Canal, Virginia and North Carolina, from September 1 to December 31, 1899, both dates inclusive, of which the waterways of this improvement are the approaches.

Articles.		Quantity.	Value.
Lumber, B. M	M feet	20,334,000	$244,000
Shingles	number	1,152,000	5,760
Mill logs, B. M	M feet	444,000	4,440
Phosphate	tons	1,308	26,160
Miscellaneous	do	9,921	
Cord wood	cords	235	470
Coal	tons	1,178	3,534
Corn	bushels	1,640	820
Bricks		100,000	700
Total			285,884

Vessels.	Number.	Average draft.	Average tonnage.
		Feet.	
Steam	273	8	44
Sail	123	7	46
Barges	165	9	290
Lighters	10	5	80
Rafts	7		(*a*)
Open boats	2		
Scows	8		
Dredge	1	8	
Total	584		

a 250,000 feet.

M 8.

IMPROVEMENT OF INLAND WATER ROUTE FROM NORFOLK, VIRGINIA, TO ALBEMARLE SOUND, NORTH CAROLINA, THROUGH CURRITUCK SOUND.

Work on this improvement, in removing sunken logs from the channel of North River, North Carolina, in Currituck Sound, off Munden Point, Virginia, and North Landing River, Virginia and North Carolina, was carried on with the snag-boat *Roanoke* from July 11 to September 28, 1899. From the channel of North River, in the vicinity of Beacon No. 9, 35 sunken logs were removed between July 11 and 20, and from July 21 to 31, 1899, in Currituck Sound, off Munden Point, 9 logs and 3 telegraph poles were taken from the channel. During the month of August, 1899, 185 logs were removed from the channel of North Landing River, Virginia and North Carolina, and placed on the banks, and from September 1 to 5 and 21 to 28, 1899, 11 logs were raised and disposed of in a like manner.

Under date of May 8, 1900, proposals were solicited by newspaper advertisement for dredging at North River Bar, North Carolina, as proposed in a project for the expenditure of the balance of the appropriation of March 3, 1899 (about $7,000), submitted March 21, 1900, and approved by the Chief of Engineers March 23, 1900. Proposals were opened on June 11, 1900, but as the prices were considered to be too high the bidders were notified June 19, 1900, by authority of the Chief of Engineers, that all bids had been rejected for that reason. An abstract of the bids is appended.

The expenditures during the year amounted to $1,177.36 for removing logs, advertising, printing, and administrational expenses.

This work is in the collection districts of Norfolk and Portsmouth, Va.; and Albemarle, N. C., Norfolk, Va., and Edenton, N. C., are the nearest ports of entry. Nearest light-house, Long Point Light, in Coanjock Bay, North Carolina. Fort Monroe, Va., is the nearest fort.

The amount of revenue collected at the port of Norfolk, Va., during the fiscal year ended June 30, 1900, is $25,135.42.

Money statement.

July 1, 1899, balance unexpended		$8,012.34
June 30, 1900, amount expended during fiscal year		1,177.36
July 1, 1900, balance unexpended		6,834.98
July 1, 1900, outstanding liabilities		80.00
July 1, 1900, balance available		6,754.98
Amount (estimated) required for completion of existing project		21,667.08
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900:		
For works of improvement	$21,667.08	
For maintenance of improvement	1,800.00	
		23,467.08
Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867, of section 7 of the river and harbor act of 1899, and of sundry civil act of June 4, 1897.		

Appropriations.

For Southern Branch Elizabeth River, Virginia:		
March 3, 1873	$15,000.00	
June 23, 1874	10,000.00	
March 3, 1875	5,000.00	
August 14, 1876	5,000.00	
June 18, 1878	5,000.00	
		$40,000.00
For North Landing River, Virginia and North Carolina:		
March 3, 1879	25,000.00	
June 14, 1880	15,000.00	
March 3, 1881	7,500.00	
August 2, 1882	8,000.00	
		55,500.00
For Currituck Sound, Coinjock Bay, and North River Bar, North Carolina:		
June 18, 1878	20,000.00	
March 3, 1879	25,000.00	
June 14, 1880	25,000.00	
March 3, 1881	30,000.00	
August 2, 1882	20,000.00	
July 5, 1884	5,000.00	
August 5, 1886	10,000.00	
August 11, 1888	7,500.00	
		142,500.00
For inland water route, etc.:		
September 19, 1890	10,000.00	
July 13, 1892	9,000.00	
August 18, 1894	10,000.00	
June 3, 1896	10,000.00	
March 3, 1899	8,000.00	
		47,000.00
Total		285,000.00
Amount received from sale of property to other works		2,169.69
Aggregate		287,169.69

Abstract of proposals for dredging waterway from Norfolk Harbor, Virginia, to Albemarle Sound, North Carolina, received in response to advertisement of May 8, 1900, and under specifications of the same date opened by Maj. James B. Quinn, Corps of Engineers, at 166 Granby street, Norfolk, Va., on June 11, 1900, at 12 o'clock noon.

No. of proposal.	Name and address of bidder.	Price bid per cubic yard, scow measurement.	Amount available for dredging.	Amount of material which can be removed with available funds at the price bid.
		Cents.		*Cubic yards.*
a1	Norfolk Dredging Co., Norfolk, Va	78	$6,000	7,666$\frac{2}{3}$
2	John L. Mills, Camden, N. J	70	6,000	8,571$\frac{3}{7}$

a Informal. Time stated for commencing work not as required under specifications.

COMMERCIAL STATISTICS.

The following statistics relative to the commerce of the inland water route from Norfolk Harbor, Virginia, to Albemarle Sound, North Carolina, during the calendar year 1899, were compiled from a statement furnished by the Albemarle and Chesapeake Canal Company:

Vessels.	Number.	Draft.	Average tonnage.
		Feet.	
Steamers	2,481	3 to 9	63
Rigged vessels	1,233	3 to 9	51
Unrigged vessels	959	3 to 8	215
Rafts of mill logs, etc	278	....	....

Total number of vessels	4,952
Total tonnage of vessels	422,578
Estimated number of tons of merchandise carried	300,000
Estimated value of merchandise carried	$2,500,000

Approximate amount of freight of all kinds passing through this route.

	Tons.		Tons.
1888	335,758	1894	285,455
1889	372,617	1895	324,866
1890	403,111	1896	322,947
1891	328,609	1897	301,055
1892	281,542	1898	188,573
1893	296,520	1899	300,000

M 9.

IMPROVEMENT OF EDENTON BAY, NORTH CAROLINA.

Bids were invited by public notice of ten days dated August 16, 1899, for dredging Edenton Bay, North Carolina, the balance available for work amounting to $2,000, appropriated by the act of August 5, 1886. A copy of an abstract of the bids received is appended hereto.

The bid of James Caler, of Norfolk, Va., being the lowest, was accepted September 6, 1899, and the contract was duly executed September 11, 1899.

Work was commenced September 11 and finished September 21, 1899, 10,005 cubic yards, scow measurement, of material being removed at the contract price of 21 cents. The material was very soft, but numerous stumps were encountered in the work and it was necessary on several occasions, in order to remove them, to place and explode small charges of dynamite.

The location of the dredging was about 600 feet from the Norfolk and Southern Railroad wharf, and consisted in the removal of the point of the angle on the south side of the channel. The point was cut back 120 feet to a depth of 9 feet at mean low water. The length of the last cut was 520 feet.

The expenditures during the fiscal year amounted to $2,260.73 for dredging, inspection, and office expenses.

This improvement is in the collection district of Albemarle, N. C., and Edenton, N. C., is the nearest port of entry. Nearest light-house, Roanoke River Light, North Carolina.

No revenue was collected at the port of Edenton, N. C., during the fiscal year ended June 30, 1900.

Money statement.

July 1, 1899, balance unexpended	$2,447.41
June 30, 1900, amount expended during fiscal year	2,260.73
July 1, 1900, balance unexpended	186.68
Amount (estimated) required for completion of existing project	6,000.00
Amount that can be profitably expended in fiscal year ending June 30, 1902, in addition to the balance available July 1, 1900	6,000.00

Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867 and of sundry civil act of June 4, 1897.

APPROPRIATIONS.

By act approved—

June 18, 1878	$4,000
March 3, 1879	1,000
July 5, 1884	10,000
August 5, 1886	2,000
Total	17,000

Abstract of proposals for dredging in Edenton Bay, North Carolina, received in response to public notice dated August 16, 1899, and under specifications of the same date, opened by Maj. Thos. L. Casey, Corps of Engineers, at Norfolk, Va., on August 28, 1899, at 12 o'clock.

No. of proposal.	Name and address of bidder.	Price bid per cubic yard, scow measurement.	Amount available for dredging.	Amount of material that can be removed with available funds.	Remarks.
		Cents.		*Cubic yards.*	
1	James Caler, Norfolk, Va.	[a]21	$2,000	9,523	Certificate as to guarantors by deputy collector of customs.
2	Fred E. Jones, Norfolk, Va.	35	2,000	5,714	Name of one guarantor omitted.

[a] Lowest bid; recommended for acceptance.

ABSTRACT OF CONTRACT IN FORCE.

Name of contractor, James Caler, Norfolk, Va.
Date of approval, September 19, 1899.
Date of beginning work, September 11, 1899.
Date of expiration, September 21, 1899.

COMMERCIAL STATISTICS.

The following statistics relative to the commerce of Edenton Bay, North Carolina, were kindly furnished by the auditor of the Norfolk and Southern Railroad and indicate the traffic for the calendar year 1899:

	Tons.
North	76,652
South	31,470
Total	108,122

Approximate amount of freight of all kinds shipped and received by water.

	Tons.
1898	160,109
1899	108,122

M 10.

IMPROVEMENT OF ROANOKE RIVER, NORTH CAROLINA.

Work on this improvement in the removal of the obstructions from the channel was in progress from October 1, 1899, to June 30, 1900, inclusive, the snag boat *Roanoke*, belonging to the work, being employed on the river during that period. The work performed consisted in the removal of 138 trees, 30 logs, 23 snags, and 2 stumps from the channel at several localities between the thirty-first and one hundred and twenty-seventh mile points. At the sixty-fifth, sixty-sixth to sixty-eighth, and seventy-ninth mile points bank slides occurred, and from these 28, 31, and 4 overhanging trees were cut down and the pieces hauled out.

From July 11 to September 15, 1899, the snag boat was in service on the inland water route from Norfolk Harbor, Virginia, to Albemarle Sound, and during the latter part of September was under repair at Norfolk, such work as cleaning and painting the hull of the boat, renewing defective pipes, wheel arms, rearranging the steering gear, and enlarging the rudders being done. The expenditures for this purpose amounted to $170.82. The crew of the boat performed nearly all of the work, the amount above being necessary to pay for use of the marine railway, for materials, and for hire of machinists.

An inspection of the river between Palmyra and the site of the old railroad bridge, about 1 mile below Weldon, N. C., was made May 23 to 25, 1900, by the local officer, and for this purpose the snag boat was used. After this inspection the snag boat removed 3 trees in the channel at Looking Glass Bar, and since that work was done the crew has been employed in making an examination of the rocky bar in the river about 1 mile below Weldon, to the close of the fiscal year, with a view to preparing an estimate for the removal of said bar, as the citizens of that place and shippers located along the stream are anxious to put on a line of boats between there and either Norfolk or Baltimore. This they can not do at present, as the depth of water at the bar before mentioned will not permit of navigation above it during the low-water season. A depth of 4 feet at ordinary low water is desired through this bar, and I think the expenditure of funds sufficient to make a channel about 100 feet wide of the depth mentioned is justified in view of the prospective traffic which would take advantage of the improvement when made. The territory in the vicinity of Weldon is in a flourishing condition, with prospects of continued improvement in the future.

The expenditures in the fiscal year 1900 were for removing obstructions, repairs to plant, and office expenses, and amounted to $6,184.56.

This river is in the collection district of Albemarle, N. C., and Edenton, N. C., is the nearest port of entry. Nearest light-house, Roanoke River light, North Carolina, at mouth of river. Nearest fort, Fort Monroe, Va.

No revenue was collected at the port of Edenton, N. C., during the fiscal year ended June 30, 1900.

Money statement.

July 1, 1899, balance unexpended	$31,562.52
June 30, 1900, amount expended during fiscal year	6,184.56
July 1, 1900, balance unexpended	25,377.96
Amount (estimated) required for completion of existing project Submitted in compliance with requirements of sections 2 of river and harbor acts of 1866 and 1867.	41,000.00

APPROPRIATIONS.

March 3, 1871	$20,000	July 13, 1892	$50,000
June 10, 1872	10,000	August 18, 1894	30,000
March 3, 1873	10,000	June 3, 1896	10,000
June 23, 1874	5,000		
August 2, 1882	5,000	Total	228,000
July 5, 1884	3,000	Amount received from sale of property to other works	1,338
August 5, 1886	20,000		
August 11, 1888	40,000		
September 19, 1890	25,000	Aggregate	229,338

COMMERCIAL STATISTICS.

A full statement of the commerce could not be secured for the calender year 1899. The replies received show an aggregate of 19,784 tons of freight carried on the river during 1899.

A new line of transportation was established during the fiscal year from Norfolk, Va., to points on the river as far as Hamilton, N. C.

Approximate amount of freight of all kinds received and shipped by water.

	Tons.		Tons.
1870	150,000	1892	42,039
1890	182,700	1893	121,024
1891	376,181		

M II.

REMOVING SUNKEN VESSELS OR CRAFT OBSTRUCTING OR ENDANGERING NAVIGATION.

Wreck of the ferryboat Manhasset.—This ferryboat was sunk in about 30 feet of water at mean low tide in the southern branch of the Elizabeth River, on the east side of the channel, a short distance below the Norfolk Navy-Yard. Its removal was authorized July 29, 1899, at an estimated cost of $2,500.

Under date of August 16, 1899, bids for removing the wreck were invited by public notice. Mr. Charles W. Johnston, of Lewes, Del., made the lowest offer for doing the work and the contract was awarded to him and duly executed, dated September 8, 1899. An abstract of the bids received is appended.

Mr. Johnston started the work early in September, 1899, and at the close of that month had raised the vessel and had it hauled out on a marine railway which was near by. The expenditures on account of this wreck amounted to $1,406.08, of which $1,190 was paid to the contractor for removing the wreck, as called for by his contract.

Wrecks of barge Caravan and schooner Augustus Palmer.—The removal of these wrecks at an estimated cost of $6,000 was authorized September 23, 1899. The wreck of the *Caravan* was in about 28 feet of water and that of the *Augustus Palmer* in about 22 feet of water, the former on the Lower Middle Ground and the latter on the Tail of the Horseshoe, in Chesapeake Bay.

Bids were solicited for removing the wrecks by public notice dated October 16, 1899, the lowest received being those of Mr. William D. Johnston, of Lewes, Del., to remove the *Caravan* for $884 and the *Augustus Palmer* for $1,806. An abstract of the bids received is appended hereto. A contract was made with Mr. Johnston at those figures, dated November 7, 1899.

The contractor removed the wrecks during November and December, 1899, by means of blasting. The expenditures on account of these wrecks amounted to $3,165.37.

Wrecked cars in Sewall Point Channel, Elizabeth River, Virginia.—The cars alluded to were being transported on a barge of the New York, Philadelphia and Norfolk Railroad, and were knocked from the barge into the channel mentioned by reason of a collision between the said barge and a steamer of the Old Dominion Steamship Company.

Upon petition of several of the steamboat lines entering Norfolk the Secretary of War, on October 30, 1899, directed that the cars be removed, under section 20 of the act of March 3, 1899, as the obstruction caused to navigation constituted an emergency. An agreement was accordingly made with Mr. M. T. Cashin, a local wrecker, to remove the cars for $233.60, and he performed the work early in November, 1899, by raising such parts of the cars as his plant was capable of doing, and in destroying the remainder by blasting.

No expenditures were made other than the amount paid for removing the cars.

Wreck of schooner R. L. Loper.—This vessel was sunk near the mouth of Hampton Creek, Virginia, on the west side of the channel.

The removal of the wreck was authorized April 9, 1900, at a cost of $100, and bids for the work were invited by public notice and opened April 24, 1900, at noon. An abstract of those received is appended hereto.

Mr. S. A. Harney was awarded the work, and on May 1, 1900, he raised the vessel, and towed her to Norfolk on the next day to be overhauled. The work cost $100.

Abstract of proposals for removing wreck of ferryboat Manhasset in the Southern Branch of the Elizabeth River, Virginia, received in response to public notice dated August 16, 1899, and under specifications of the same date, opened by Maj. Thos. L. Casey, Corps of Engineers, at Norfolk, Va., on August 28, 1899, at 12 o'clock.

No. of proposal.	Name and address of bidder.	Price bid.	Remarks.
1	M. T. Cashin, Norfolk, Va.	$1,711	
2	International Wrecking, Salvage and Submarine Co., Atlantic City, N. J.	1,495	Name of bidder omitted from one of blank spaces of guaranty. Certificate as to guarantors made by county clerk.
3	Charles W. Johnston, Lewes, Del.	*a*1,190	
4	W. H. French, Norfolk, Va.	1,250	Certificate as to guarantors made by deputy collector of customs.

a Lowest bid; recommended for acceptance.

Abstract of proposals for removing wrecks of barge Caravan and schooner Augustus Palmer, in Lower Chesapeake Bay, Virginia, received in response to public notice dated October 16, 1899, and under specifications of the same date, opened by Maj. Thos. L. Casey, Corps of Engineers, on October 26, 1899, at 12 o'clock, at Norfolk, Va.

No. of proposal.	Name and address of bidder.	Price bid for removing wreck Caravan.	Price bid for removing wreck Augustus Palmer.	Aggregate of bids.
*a*1	William D. Johnston, Lewes, Del.	$884	$1,806	$2,690
*b*2	Oliver H. Guttridge, Atlantic City, N. J	1,000	2,600	3,600
3	Henry Seymour, Norfolk, Va.	4,200	4,800	9,000

a Recommended for acceptance. *b* Certificate as to guarantors made by county clerk.

Abstract of proposals for removing wreck of the schooner R. L. Loper, in Hampton Creek, Virginia, received in response to public notice, dated April 14, 1900, and under specifications of the same date, opened by Maj. James B. Quinn, Corps of Engineers, on April 24, 1900, at 12 o'clock noon, at Norfolk, Va.

No. of proposal.	Name and address of bidder.	Price bid.
1	W. H. French, Berkley, Va	$270
2	Charles W. Johnston, Lewes, Del	229
3	S. A. Harney, Hampton, Va	a100

a Lowest bid.

ABSTRACT OF CONTRACTS IN FORCE.

Name of contractor.	Date of approval.	Date of beginning work.	Date of expiration.
Charles W. Johnston	Sept. 8, 1899	Sept. 9, 1899	Sept. 30, 1899
William D. Johnston	Nov. 7, 1899	Nov. 17, 1899	Dec. 7, 1899

M 12.

EXAMINATION AND SURVEY OF MIDDLE GROUND BAR, HAMPTON ROADS, VIRGINIA.

[Printed in House Doc. No. 93, Fifty-sixth Congress, first session.]

Office of the Chief of Engineers,
United States Army,
Washington, November 27, 1899.

Sir: The river and harbor act of March 3, 1899, provided for preliminary examination and survey of channel at Middle Ground Bar, in the harbor of Hampton Roads, Virginia, with a view of determining what amount of dredging is necessary over said bar to secure a channel 500 feet wide and 30 feet deep at mean low tide, and I have the honor to submit the accompanying copy of reports on the subject, dated July 14, 1899, and November 20, 1899, respectively, with map,[1] by Maj. Thomas L. Casey, Corps of Engineers.

Major Casey states that to secure a mean low-water channel 30 feet deep and 500 feet wide will require the removal of 1,500,000 cubic yards of material, at an estimated cost, including contingencies, of $225,000. It is his opinion, concurred in by Col. Peter C. Hains, Corps of Engineers, Division Engineer, that the General Government should undertake the improvement of this channel.

Very respectfully, your obedient servant,

John M. Wilson,
Brig. Gen., Chief of Engineers,
U. S. Army.

Hon. Elihu Root,
Secretary of War.

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[1] Not reprinted. Printed in House Doc. No. 93, Fifty-sixth Congress, first session.

PRELIMINARY EXAMINATION OF CHANNEL AT MIDDLE GROUND BAR, IN THE HARBOR OF HAMPTON ROADS, VIRGINIA, WITH A VIEW TO DETERMINING WHAT AMOUNT OF DREDGING IS NECESSARY OVER SAID BAR TO SECURE A CHANNEL 500 FEET WIDE AND 30 DEEP FEET AT MEAN LOW TIDE.

UNITED STATES ENGINEER OFFICE,
Norfolk, Va., July 14, 1899.

GENERAL: I have the honor to submit the following report, based upon a preliminary examination of the "channel at Middle Ground Bar, in the harbor of Hampton Roads, with a view to determining what amount of dredging is necessary over said bar to secure a channel 500 feet wide and 30 feet deep at mean low tide."

The channel from Chesapeake Bay to Newport News, Va., is obstructed by a bar known as the Middle Ground. The south channel is the one now used by deep-draft vessels and is the site of the proposed improvement, as shown approximately on the tracing[1] sent herewith. This channel, though less direct than the north one, is selected because of the smaller amount of work, the softer material, and the better prospect of permanency. The material is very readily removable, and the soundings, as shown, were carefully verified along the proposed work. The crest of the bar appears to be an extension of the Middle Ground to the southwest.

Statistics are submitted showing the business of the port of Newport News. To describe the territory concerned in this improvement would be impossible, as Richmond, Cincinnati, and many large cities of the West have an outlet here. The United States Navy finds a safe harbor and coaling station at Norfolk, and there is at Newport News one of the largest shipbuilding companies in America. At that point there are also two dry docks—one not yet completed—which are among the largest in the country.

Statements from the Chesapeake and Ohio Railway Company, the Shipbuilding and Dry Dock Company, and figures from the books at the custom-house are appended.

Evidently there is a valid claim for improvement if the bar is an obstruction in any way to present or contemplated navigation. The minimum low-water depth at present is 25½ feet. Large vessels cross the bar at high water, which gives a navigable depth of 28½ feet. The largest of the Chesapeake and Ohio freighters load 28 feet draft.

Some of the ships which have entered Newport News recently are:

Name.	Draft.			
	In.		Out.	
	Ft.	*in.*	*Ft.*	*in.*
Spanish steamship Riogano	25	6	27	0
British steamship Lock Lay	24	0	25	0
Austrian steamship Betty	24	0	25	0
British steamship Inchmaree	24	6	25	6
British steamship Inchuloa	24	6	25	0

This bar could be surveyed for $500, provided the south channel is accepted as the route. The Virginia Pilots Association and others assert that this is the route along which the improvement is most needed.

The total number of cubic yards to be removed in order to secure the 30-foot channel described in the act of Congress is about 1,500,000, and its cost per cubic yard would probably be in the neighborhood of 15 cents.

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[1] Not printed.

In my opinion this channel is worthy of improvement by the General Government.

Respectfully submitted.

THOS. L. CASEY,
Major, Corps of Engineers.

Brig. Gen. JOHN M. WILSON,
Chief of Engineers, U. S. A.

[Third indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
August 14, 1899.

Respectfully submitted to the Secretary of War.

In accordance with the provisions of the river and harbor act of March 3, 1899, a preliminary examination has been made of the channel at Middle Ground Bar, in the harbor of Hampton Roads, Virginia (full text of item quoted within).

The locality is reported to be worthy of improvement, and I recommend that a survey be made and the cost of improvement be estimated.

A. MACKENZIE,
Acting Chief of Engineers.

WAR DEPARTMENT,
August 24, 1899.

Approved.

ELIHU ROOT,
Secretary of War.

LETTER OF THE CHESAPEAKE AND OHIO RAILWAY COMPANY.

NEWPORT NEWS, *July 11, 1899.*

DEAR SIR: Replying to your favor July 3, making certain inquiries as to the port of Newport News, would advise in reply to your first inquiry:

The greatest draft vessels we have coming to our wharves is 29 feet.

Second. Would say yes. The steamers belonging to the American Line, *St. Louis* and *St. Paul*, etc., when taking troops last August declined to come to Newport News, and we were forced to lighter the troops down to Hampton Roads for them, their captains claiming there was not enough water for them to come to our port. Secondly, would advise that the large first-class battle ships and cruisers of the United States Navy calling at this port for coaling purposes or for repairs at the shipyard are obliged to wait for high water.

Third. Would say that vessels load to their full capacity at present, but they have to wait for flood tide to go to sea.

Fourth. Would say that this company is contemplating building more steamers in the near future, and they will be of the same draft as the *Rapidan*, which draws 29 feet loaded, which we have difficulty in taking to sea excepting at high water.

Fifth. As to approximate number of tons, would say that our business in tonnage for the past twelve months is, approximately, (A) general merchandise, including grain, 2,000,000 tons; (B) coal, 2,000,000 tons.

In replying further to your fifth inquiry, as to any reason I have why this improvement should be made, would say that Newport News, Va., is a rapidly growing port and the nearest outlet to the shippers of the great West, and it is of the utmost importance that there be no limit to the tonnage desiring to call at our port to carry the products of the great West to the various ports of the world. While the dredging of the channel might be looked upon from a narrow standpoint as a local improvement or matter, yet the benefit derived from the larger class of vessels being able to touch at Newport News would reduce the ocean freight and thereby place the farmers and manufacturers of the great West in reach of a larger market for their products.

Yours, truly,

H. E. PARKER,
Superintendent Terminals.

Maj. THOS. L. CASEY,
Corps of Engineers, U. S. A.

LETTER OF THE NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY.

NEWPORT NEWS, VA., *July 6, 1899.*

DEAR SIR: Replying to your letter of the 3d instant, and taking up your questions as they are numbered, I beg to say:

1. We have vessels coming to our yard now drawing 27 feet and 28 feet of water, which is about the maximum that can come up over the Middle Ground Bar.
2. I do not recall any particular instance where a vessel has been unable to come here by lack of water, but they have frequently been obliged to wait for high water to cross the bar.
3. The depth of sill of our present dry dock is 25 feet; that of our new dock will be 30 feet at mean high water.
4. The approximate value of work done at this yard in a year will be about $5,000,000.
5. We should be greatly benefited by increasing depth of water over Middle Ground Bar to 30 feet at low water, and in order to operate our new dock to its full capacity it will be necessary that this improvement be made within a year's time.
6. Aside from the benefit to be derived from this improvement in connection with the work of this company, it will be a great benefit, in my judgment, to the increasing commerce of this port. There is, as you know, a tendency to increase the size of vessels. We are building ships here now that could not run into this port without discharging part of their cargo before they could pass over the Middle Ground Bar. It would also be an advantage to the Government, in that it would enable the heaviest cruisers to come up into the James River at any stage of the tide, while now they are compelled to wait for the "top of the tide" if such vessels have occasion to come up the James as far as the shipyard.

Yours, very truly,

W. A. POST,
General Superintendent.

Maj. THOS. L. CASEY,
Corps of Engineers, U. S. A.

Statement from collector of customs, port of Newport News, Va.

	Number.	Value of cargoes.	Customs collected.
Vessels entered	213	$1,256,000	$820,000
Vessels cleared	534	28,000,000	....

The above indicates the foreign trade from July 1, 1898, to June 30, 1899, with the exception of a few entries for the last few days of June, 1899, which had not been recorded when the figures given above were obtained.

SURVEY OF CHANNEL AT MIDDLE GROUND BAR, IN THE HARBOR OF HAMPTON ROADS, VIRGINIA, WITH A VIEW TO DETERMINING WHAT AMOUNT OF DREDGING IS NECESSARY OVER SAID BAR TO SECURE A CHANNEL 500 FEET WIDE AND 30 FEET DEEP AT MEAN LOW TIDE.

UNITED STATES ENGINEER OFFICE,
Norfolk, Va., November 20, 1899.

GENERAL: In regard to the channel through the Newport News Middle Ground Bar, in the Harbor of Hampton Roads, Virginia, the survey of which was ordered by Department letter of August 25, 1899, I have the honor to report that the existing conditions are shown in detail on the accompanying tracing, which is the result of a trigonometrical survey made between September 14 and 29, 1899, by Mr. J. P. White, assistant engineer.

In order to secure a mean low-water depth of 30 feet (allowing for back fill and overdepth) over a width of 500 feet, it will be necessary to excavate 1,500,000 cubic yards of material, which, at 13½ cents per cubic yard, scow measurement, will cost $202,500, plus 10 per cent for contingencies, or $225,000.

It is my opinion that the General Government should undertake the improvement of this channel, not only on account of its importance commercially, which alone would seem to justify it, but to render it available in case of necessity for the larger vessels of the Navy. During the recent war, when it was advantageous to have troops embark from Newport News, it was demonstrated that some of the vessels ordered there for their transportation could not pass through this channel on account of insufficient depth, and resort was had, at great expense, to lightering the troops and supplies to the ships, which were at anchor near Old Point Comfort.

The lines of the proposed channel as shown on the tracing follow as closely as practicable the mean axis of tidal flow, and will probably result in virtual permanence of depth.

In regard to the commercial importance of the channel there is appended hereto a letter from the collector of customs at Newport News, Va., and a statement of the business of that port during August, September, and October, 1898, and the corresponding months of 1899.

Respectfully submitted.

Thos. L. Casey,
Major, Corps of Engineers.

Brig. Gen. John M. Wilson,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

U. S. Engineer Office,
Baltimore, Md., November 22, 1899.

Respectfully submitted to the Chief of Engineers, United States Army.

I concur in the views of the district engineer. I know from personal experience in the embarkation at Newport News of my brigade for service in Porto Rico that some of the transports could not come to the dock at Newport News on account of the lack of depth of the channel on the Middle Ground. In consequence delay and expense were incurred by the necessity for using lighters.

Peter C. Hains,
Colonel, Corps of Engineers,
Division Engineer, Southeast Division.

LETTER OF MR. J. W. ELLIOTT, COLLECTOR OF CUSTOMS, PORT OF NEWPORT NEWS, VA.

Office of the Collector of Customs,
Newport News, Va., November 13, 1899.

Sir: As requested in your favor of the 10th instant, I beg to hand you herewith statement of the value of imports at this port for the months of August, September, and October, 1898, and corresponding months in the year 1899, and the amount of duty collected on the same entered for consumption, and amount collectible on that portion entered and forwarded in bond, and also a statement showing the total of the two classes.

Also a statement of the value of the exports for the same period.

The increase of business, as shown by these statements, is not confined to the period named, but has been gradual for the past two years, but perhaps not quite so rapid.

I will add for your information that among the vessels in the regular trade between this port and foreign countries are six or seven with a draft of over 26 feet; one of these, the *Rapidan*, when fully loaded has a draft of over 29 feet. This vessel on every trip has been obliged to sail with three or four thousand tons cargo less than her capacity, so her agents inform me, on account of the Middle Ground Bar.

Trusting this information may meet your requirements, I am,

Very truly, yours,

J. W. ELLIOTT, *Collector*.

Maj. THOS. L. CASEY,
Corps of Engineers, U. S. A.

STATEMENT OF IMPORTS AND EXPORTS.

Value of imports at port of Newport News, Va., and amount of duties collected in months of August, September, and October, 1898, and corresponding months in 1899.

Month.	1898.		1899.	
	Value.	Duties collected.	Value.	Duties collected.
August	$69,490.00	$28,943.34	$150,824.00	$47,858.87
September	95,141.00	34,845.93	189,765.00	56,897.11
October	96,111.00	25,210.02	172,874.00	55,643.68

Merchandise received and forwarded in bond, without appraisement, under section 1, act of June 10, 1880, at the port of Newport News, Va., in the months of August, September, and October, 1898, and corresponding months in 1899.

Month.	1898.		1899.	
	Value.	Duties collectible.	Value.	Duties collectible.
August	$190,143.00	$105,337.49	$340,175.00	$155,351.60
September	141,360.00	74,314.15	396,775.00	145,815.14
October	130,280.00	50,963.91	339,422.00	138,703.75

Total value of merchandise imported at port of Newport News, Va., and amount of duties collected and collectible in the months of August, September, and October, 1898, and corresponding months in 1899.

Month.	1898.		1899.	
	Value.	Duty.	Value.	Duty.
August	$254,633.00	$134,280.83	$490,499.00	$208,205.47
September	236,501.00	109,160.08	586,540.00	202,212.25
October	226,391.00	76,173.93	512,296.00	194,347.62
Total	717,525.00	319,614.84	1,589,335.00	599,765.34
Monthly average	239,175.00	106,538.28	529,778.33	199,921.78

Value of exports from the port of Newport News, Va., in the months of August, September, and October, 1898, and corresponding months in 1899.

Month.	1898.	1899.
August	$1,618,092	$1,701,856
September	2,223,364	8,669,446
October	1,094,692	2,304,328

M 13.

MODIFICATION OF HARBOR LINES IN ELIZABETH RIVER AT NORFOLK, VIRGINIA.

UNITED STATES ENGINEER OFFICE,
Norfolk, Va., September 1, 1899.

SIR: In compliance with a request of the Norfolk Board of Harbor Commissioners, made through its president in the accompanying letter, and in view of the fact that the widening of the harbor by the cutting off of 400 feet of Hospital Point is an improvement which is greatly needed and essential to the commercial prosperity of the city, and, further, because of the fact that already applications are being made to build wharf property in that vicinity, I have the honor to recommend that the harbor lines in the vicinity of Hospital Point be modified to conform to the lines laid down on the accompanying tracing.[1]

Very respectfully, your obedient servant,

THOS. L. CASEY,
Major, Corps of Engineers.

Hon. ELIHU ROOT,
Secretary of War.
(Through the Chief of Engineers.)

[First indorsement.]

OFFICE CHIEF OF ENGINEERS,
U. S. ARMY,
September 12, 1899.

Respectfully submitted to the Secretary of War.

Application is made by the Board of Harbor Commissioners of Norfolk, Va., for a modification of the established pierhead and bulkhead lines of Elizabeth River in the vicinity of Hospital Point.

The existing pierhead line, established by the Secretary of War May 9, 1890, runs along the outer edge of Hospital Point, about 400 feet in advance of the bulkhead line.

Major Casey, the district engineer officer, submits a map on which the modified lines desired are shown, the pierhead line by a solid, and the bulkhead line by a broken, black line. These lines are about 400 feet to the shoreward of the existing lines.

The only existing structure that will be affected by the change in lines is Hospital Point, which belongs to the Government and is under the control of the Navy Department.

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[1] Not printed.

The widening of the harbor at this locality by cutting off about 400 feet of the Point is very much desired by the commercial interests, is unobjectionable to the interests of the Government, and a project therefor has been submitted to Congress. In view of the probability of favorable action on this project, it is deemed essential to the public interests to modify the harbor lines as suggested, in order that no private wharves may be built out to the existing lines.

I accordingly recommend that the modified lines suggested by Major Casey be approved, and that the Secretary place his approval upon the tracing which has been prepared for his signature.

JOHN M. WILSON,
Brig. Gen., Chief of Engineers,
U. S. Army.

[NOTE.—The lines referred to in the above letter, and shown on the map accompanying, were approved by the Secretary of War December 13, 1899, the approval being indicated on the map.]

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